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ABSTRACT

In this study, several examples of the relationship between environmental structure and the functional characteristics of objects interacting in an elementary educational environment are presented. These examples are interpreted within a frame of reference derived from a synthesis of concepts and principles from behavioral science and general systems theories. Part I provides evidence which indicates that: (1) in a relatively desegregated setting, homogeneous ability grouping tends to separate children ethnically and socio-economically, and (2) when either a heterogeneous or homogeneous environment is compounded by a self-contained classroom, the pattern of instruction across settings tends to be uniform. Part II presents a theoretical discussion which attempts to explain the process underlying the relationship between structure and function in an educational environment. An alternative model of elementary school and classroom organization is presented. (Author/DM)

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STRUCTURE AND FUNCTION
A BEHAVIORAL AND SYSTEMIC INTERPRETATION

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MAY 1971

"The science of logic never made a man reason rightly, and the science of ethics . . . never made a man behave rightly. The most such sciences can do is to help us catch ourselves up and check ourselves more articulately after we have made mistakes. . . ."

(From William James, Talks to Teachers in Psychology. New York: Holt, Rinehart and Winston, Inc., 1920, first published in 1899.)

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D. E.

TABLE OF CONTENTS

Page

ACKNOWLEDGMENTS v
LIST OF TABLES ix
LIST OF ILLUSTRATIONS xi

INTRODUCTION 1

The Problem 1
Organization of the Study 6

PART I. THE STRUCTURAL CONSEQUENCES OF ABILITY GROUPING IN SELF-CONTAINED CLASSROOM ENVIRONMENTS

Chapter

I. HOMOGENEOUS AND HETEROGENEOUS GROUPING: DEFINITIONS AND REVIEW OF RESEARCH 8

Definition of Terms 8
Issues and Arguments 10
Summary of Research 12

II. SOCIO-ECONOMIC AND ETHNIC STATUS IN RELATION TO TEST PERFORMANCE 17

Socio-economic Status 18
Ethnic Status 19

III. THE ETHNIC AND SOCIO-ECONOMIC COMPOSITION OF CLASSES ORGANIZED ACCORDING TO THE PRINCIPLE OF HOMOGENEOUS ABILITY GROUPING 24

A Reanalysis of Coleman's Data 24
Plainfield, New Jersey Study 27
Procedures for Assigning Children to Classes . . 29
The Case of Hobson v. Hansen 38
General Conclusions 43

IV. PATTERNS OF INSTRUCTION IN HOMOGENEOUS AND HETEROGENEOUS SELF-CONTAINED CLASSROOMS 45

Individual Instruction 45
Organization of Schools and Classrooms Represented in the Data 47
Data Comparing the Patterns of Instruction in Self-Contained Homogeneous and Heterogeneous Classrooms 48

Chapter Page

PART II. A BEHAVIORAL AND SYSTEMIC INTERPRETATION OF THE RELATIONSHIP BETWEEN STRUCTURE AND FUNCTION

V. A BEHAVIORAL-SYSTEMS FRAME OF REFERENCE 59

Behavioral Frame of Reference 60
Systemic Frame of Reference 65
Organizational Structure and Instructional Consequences 69
Major Implications 73

VI. A MODEL TO INDIVIDUALIZE INSTRUCTION IN URBAN ELEMENTARY SCHOOLS: THE STAGGERED SESSION 77

VII. SUMMARY AND SOME CONCLUDING REMARKS 93

BIBLIOGRAPHY 99

LIST OF TABLES

Table Page

1. Criterion Variables used Most Frequently in Assigning Children to Classrooms 5

2. Criterion Variables used Most Frequently in Determining the Effect of Ability Grouping 5

3. Means and Standard Deviations of Selected Test Scores of Students in Low- and Middle-Income Schools in Five Large Cities 20

4. Verbal Ability, Reading Comprehension and Mathematics Achievement: Number of Standard Deviations Below the Mean for Whites in the Metropolitan Northeast in Grades 6, 9 and 12 21

5. Verbal Ability, Reading Comprehension and Mathematics Achievement: Number of Grade Levels Behind the Average for Whites in the Metropolitan Northeast in Grades 6, 9 and 12 22

6. Percent of Ninth-Grade Students in Majority White Classes, by Race, Program of Study, and Percent White Enrollment in Their School 26

7. Percent of Ninth-Grade Students in Majority White Classes, by Race, Track Level, and Percent White Enrollment in the School 28

8. Enrollment by School and Race, Plainfield, New Jersey (April 1, 1969) 30

9. Percentages of the Hubbard Junior High School Black and White Eighth-Grade Students, 1968-69, Enrolled in W, X, and Y Ability Groups by Subject Area 32

10. Percentage Composition of W, X, and Y Ability Groups, Hubbard Junior High School, Eighth Grade, 1968-69 (by Race) 34

11. Number of Classes, Average and Range of Class Size, and Percent of White Students by Grade and Level in United States History, May 1969 36

12. Number of Classes, Average and Range of Class Size, and Percent of White Students by Grade and Level in English, May 1969 37

13. The Relationship between Tracking and the Socio-Economic Separation of Children in High School 39

Table Page

14. The Relationship between Tracking and the Socio-Economic Separation of Children in Junior High School 39

15. The Relationship between Tracking and the Socio-Economic Separation of Children in Elementary School 39

16. Distribution of Track Offerings in Elementary Schools According to Ethnic and Socio-Economic Status of Students 42

17. Percentage of Blacks and Whites Enrolled in Special Academic Tracks in Relation to Proportionate Representation in Student Body 42

18. Number of Interview-Questionnaires Returned from Heterogeneous and Homogeneous Self-Contained Classes According to Grade Level 49

19. Average Range of Ability and Number of Instructional Groups Found in the Average Homogeneous and Heterogeneous Classroom 52

20. Basis on which Instructional Groups are Formed 53

21. Question: Do All Children/Groups Use the Same Material? 55

22. Question: Do All Children/Groups Engage in the Same Activities? 55

23. Teacher Report as to Reason Why Instruction Tends to be Class Oriented 56

24. Question: Please Rank Each Subject Area in Terms of the Number of Children in Your Class that are Progressing Very Well in the Subject 57

25. Space and Resources for Center Activities 82

26. Average Register and Number of Classes in P.S. X 82

LIST OF ILLUSTRATIONS

Figure Page

1. A Process Model of the Relationship Between the Immediate Situation and the Behavior Emitted in that Situation 63

2. A System in an Environment 66

3. The Interdependence of Teacher and Student Behaviors in a Series of Encounters 68

4. The Operation of Exogenous Variables 70

5. A Behavioral Systems Model of Behavior 71

6. Patterns and Products of Instruction 74

7. Schedules in the Staggered Session 80

8. Triple Version of Figure 7 85

9. Three Classes Clustered in the Staggered Session 89

ABSTRACT

STRUCTURE AND FUNCTION: A BEHAVIORAL AND SYSTEMIC INTERPRETATION

by
Dominick Esposito

In this study, several examples of the relationship between environmental structure and the functional characteristics of objects interacting in an environment are presented and interpreted within a frame of reference that is derived from a synthesis of concepts and principles taken from behavioral and general systems theories. For this purpose, data gathered from studies of ability grouping are re-examined with specific reference to two dimensions of an educational environment: a) the ethnic and socio-economic composition of classes organized according to the principles of homogeneous and heterogeneous ability grouping, and b) the patterns of instruction in homo- and heterogeneous classes when that structure is compounded by a self-contained classroom structure. In Part I of the study, evidence is presented which indicates that a) in a relatively desegregated school setting, the practice of assigning children to classes structured according to the principle of homogeneous ability grouping tends to systematically separate children along ethnic and socio-economic dimensions, and b) when either homogeneous or heterogeneous educational environment is compounded by the self-contained classroom structure the pattern of instruction across settings tends to be uniform.

Given these findings, Part II of the study presents a theoretical discussion which attempts to explain the process underlying the interrelationship between structure and function. A behavioral-systems frame of reference is formulated which suggests that: Objects in an educational environment tend to emit behaviors which are sustained by a network of

punishing and reinforcing events which are related to the structural properties of that environment. In an effort to further illustrate the relevance of structure in determining the character and quality of experience that can be provided in an educational environment, an alternative model of elementary school and classroom organization is presented.

INTRODUCTION

The Problem

Given the assumption that the quality of an educational environment is directly related to the quality of experiences that can be provided in that environment, the problem of explaining the process underlying the interrelationship between environmental structure and the functional characteristics of objects interacting in an environment is of theoretical and practical significance. That is, if the behavior manifested by teachers and students in the course of the educational process is related to the structural characteristics of the environment within which they interrelate, then the influence of environmental structure should be a subject of educational research, incorporated into the construction of theories dealing with the learning process, and applied in the design of educational environments.

The immediate concern with inquiring into the process underlying the interrelationship between structure and function implies a somewhat different approach to the problem of understanding and explaining the behavior of teachers and students engaged in the learning process. For example, the educational literature is replete with studies which attempt to demonstrate the extent to which a single variable or combination of variables descriptive of an individual at a specific point in time (e.g., intelligence, reading level, years of teaching experience, self-image, socio-economic status, etc.), affects or is related to that individual's academic and/or social development. However, there exists a paucity of studies which seek to investigate and explain in what ways and to what extent the structural properties of the natural setting influences the immediate educational environment so as to cultivate or discourage the specific teacher and student behaviors (variables) which are manifested in the course of the educational process and which are related to the extent to which the objectives of education are achieved. More often than not, research conducted in the natural setting accepts the existing structure of that setting without inquiring as to whether, and to what extent, its organization encourages and/or sustains the behavior of teachers and students engaged in the teaching-learning process. That is, to determine that an individual's status on a given variable or set of variables correlates with the achievement of a given set of educational objectives does not necessarily determine the structural organization for a particular educational setting which can cultivate and sustain the development of the variable(s) in the teaching-learning process. For example, the fact that children tend to work effectively when materials and procedures are geared to their individual learning styles, interests, abilities, etc., does not necessarily determine the ways and means of structuring the educational environment so that teacher and student behaviors compatible with an individualized approach to instruction are likely to develop in the natural classroom setting.

In this paper, several examples of the impact of environmental structure on the functional characteristics of objects interacting in that environment will be presented and interpreted within a frame of reference that derives from a synthesis of concepts and principles taken from behavioral and general systems theories. For this purpose, data gathered from studies of ability grouping will be reexamined with specific reference to two structural dimensions of the educational environment which have a bearing on the nature of experience that can be provided in the natural setting. These dimensions are a) the ethnic and socioeconomic composition of classes organized according to the principle of homogeneous ability grouping and b) the patterns of instruction in homo- and heterogeneous classes when that structure is compounded by a self-contained classroom structure.

Certainly, if the theoretical formulation developed in this paper is of scientific value, there are multiple examples of structures other than ability grouping and self-contained classrooms, which could have been selected and which would have served equally well. However, there are several sets of reasons why these structures have been selected as the background for the ideas developed later in this paper. The first set of reasons has to do with the co-incidence of homogeneous ability grouping and self-contained classrooms in American education. Data recently reviewed by this investigator indicate that in thousands of elementary and secondary school classrooms across the nation, ability grouping is a predominant method of organizing or classifying children for the purpose of instruction (NEA, 1961, 1962, 1966; Dean, 1960; Gore, 1965). In addition, large school systems tend to employ this structure more frequently and in higher proportions than do small school systems, and further, the structure is more and more prevalent as one proceeds up the educational system and is likely to be more widespread in the near future. In short, given the popularity of these practices, it is hoped that a theoretical discussion of the relationship between structure and function will not only further educational research generally, but also serve educators who are interested in reevaluating these practices and/or developing alternative structures for the purpose of improving education.

The second set of reasons has to do with the issue of whether and to what extent homogeneous ability grouping in relatively desegregated school settings conflicts with the principle of equal educational opportunity. A careful review of ability grouping research indicates that few studies have considered the educational relevance of ethnic and socio-economic variables in the placement of children into ability groups or curricular tracks and that few have considered the social and political consequences of an ability grouping structure with respect to ethnic and socio-economic separation of children. Rather, emphasis in the placement of children resides mainly in academic achievement, I.Q., and reading achievement levels (alone or in combination), while the consequences of ability grouping are examined with respect to academic achievement, attitudes, and personality development (see Tables 1 and 2).

No doubt, there are a number of competing hypotheses to explain the relative absence of empirical studies addressed to the problem of whether ability grouping, or any other administrative or educational structure, results in *de facto* segregation. With respect to ability grouping for example, one could argue that the question as to the effects of a homogeneous grouping structure on ethnic and socio-economic separation is relevant only when the particular environment under study is ethnically and socio-economically integrated. That is, given a community, school district, or school that is overwhelmingly segregated, it makes little sense to study the consequences of grouping method X in relation to the ethnic and socio-economic separation of children. Not that the question of *de facto* segregation is irrelevant, but that it is not a researchable question in the typical self-contained racially isolated local community

TABLE 1[a]

CRITERION VARIABLES USED MOST FREQUENTLY IN ASSIGNING CHILDREN TO CLASSROOMS

Criteria used to determine ability group placement	Number of studies that used this criterion	Percent
Academic achievement	36	72.0
I.Q.	25	50.0
Reading level	11	22.0
Teacher judgment	6	12.0
Sex	5	10.0
Age	4	8.0
Grade level	3	6.0
Aptitude	2	4.0
Other[b]	5	10.0
Total	50	

[a] This table appears on page 42 of the NEA Research Summary 1968-S3, Ability Grouping. It is based on 50 selected research investigations of ability grouping.

[b] Residence, interview, subject marks, interest.

TABLE 2[a]

CRITERION VARIABLES USED MOST FREQUENTLY IN DETERMINING THE EFFECT OF ABILITY GROUPING

Dependent variables used to test the effect of ability grouping	Number of Studies			
	Grades 1-6	Percentage[b]	Grades 7-12	Percentage
Academic achievement	25	93	21	66
Attitude and personality development	9	33	14	44
Social learning	6	22	10	31
Adjustment to school	4	15	9	28
Teacher reaction	7	26	7	22
Total	27[c]		32[c]	

[a] This table was derived from Table 5 of the NEA Research Summary 1968-S3, Ability Grouping.

[b] Percentages are based on the totals that appear below each grade column and are rounded to the nearest whole number.

[c] The totals should not equal the sum of the respective columns since a given study could, and frequently does, appear in more than one dependent variable category.

environment. Notwithstanding the relative absence of research on this issue, however, given a continued national effort to desegregate public schools, existing data bearing on the relationship between ability grouping and de facto segregation in the classroom should be reviewed and interpreted in the interest of promoting the principle of equal educational opportunity.

Organization of the Study

This study will be organized into two major sections. Part I will be presented in four chapters which document the relationship between the structure of classrooms organized according to the principles of homo- and heterogeneous grouping in self-contained classes, and a) the ethnic and socio-economic composition of these classes, and b) the patterns of instruction which emerge in the elementary school classroom environment. In Chapter I, the concepts of homogeneous and heterogeneous grouping will be defined and published evidence bearing on the educational impact of these practices will be reviewed. Second, to help gain a perspective of some of the factors underlying and operating as part of the structure of ability grouping, Chapter II will review evidence bearing on the relationship between ethnic and socio-economic status and performance on tests generally used in assigning or classifying children for the purpose of ability group placement. Given this background, Chapter III will review several studies which bear directly on the relationship between the ability grouping structure and the separation of children along ethnic and socio-economic dimensions. Finally, Chapter IV will present new data which compare the patterns of teacher-student interaction which emerge in homo- and heterogeneous classes when that structure is compounded by the self-contained classroom structure.

Part II of this study will present an interpretation of the data which focuses on the process underlying the interrelationship between environmental structure and the functional characteristics of objects interrelating in an environment. Chapter V will consider in what ways a behavioral and systemic understanding of environmental structure helps to explain the patterns of instruction and related educational events manifested in the classroom in the course of the teaching-learning process. It will be suggested that objects in an educational environment tend to emit behaviors which are sustained by a network of punishing and reinforcing events which are related to environmental structure.

In an effort to further illustrate the relevance of structure in determining the character and quality of experience that can be provided in an educational environment, Chapter VI will present an alternate model of classroom organization for Special Service Elementary Schools in New York City.

PART I. THE STRUCTURAL CONSEQUENCES OF ABILITY GROUPING IN SELF-CONTAINED CLASSROOM ENVIRONMENTS

CHAPTER I

HOMOGENEOUS AND HETEROGENEOUS GROUPING: DEFINITIONS AND REVIEW OF RESEARCH

In public education, the term "grouping" has been a broad rubric subsuming a wide variety of organizational plans, selection criteria, instructional methodology, and educational philosophies. Since the school has traditionally been defined by its group setting, methods have had to be devised to make the instruction of groups of children more effective and/or more manageable. The major options for vertical organization have been graded, multi-graded, or nongraded (continuous progress) schools (Goodlad, 1960). Whichever of these plans exists in a school, a concomitant pattern of horizontal organization, which assigns pupils to classes, teachers, rooms, and curricular programs, must emerge.[1]

Definition of Terms

Homogeneous grouping occurs when classes are formed on the basis of similarity on some specific characteristic of the pupils. The criterion for this classification may be age, sex, social maturity, IQ, achievement, learning style, etc. (National Education Association, 1968).

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[1] This section relies heavily on a paper prepared for Dr. Edmund W. Gordon by Susan Bernstein and Dominick Esposito, On Grouping in the Experimental Elementary School Project, November, 1969. (Mimeographed.)

The group, however, is homogeneous only with respect to this one criterion, or combination of criteria. In practice, of course, it is impossible to form a group of individuals possessing the identical degree of some characteristic (other than sex, or other nominal variable), so the objective for homogeneity is that a reduced range of that dimension(s) be represented in the group. Ability grouping is one of the many forms of homogeneous grouping, and generally refers to the use of standardized measures of intelligence, ability, or achievement in a given subject in classifying pupils into separate ability categories.

When ability grouping is applied to all grades and used throughout a school system, it is called tracking (Lederer, 1968). As applied to secondary schools, children are assigned to clearly labelled curricular tracks (i.e., College Preparatory, Vocational, Commercial, General, Technical, etc.). Practically, this means that for ninth-grade Mathematics, a student will be assigned to Algebra, Business Math, or Basic Math depending on the program (track) in which he is enrolled. For example, children enrolled in the College Preparatory track may be exposed to Biology, Chemistry, and Physics, while students enrolled in the Vocational or General track are limited to General Science and Biology. In addition, students are further channeled into Biology for College Preparation enrollees and Biology for General or Vocational enrollees. In short, ability and track-type arrangements tend to divide and separate students for instructional purposes. In the elementary school, this results in a reduction in the frequency, range, and quality of academic and social opportunities that a student has open to him; while on the secondary school level, it further means that a student is enrolled in a set program that leads to a set destination/diploma at the end (Tree, 1968).

If, for a given classroom, one is concerned with achieving a mixture of children who differ on a number of dimensions, including ability, a heterogeneous grouping policy can meet this concern. Practically, heterogeneous grouping may be accomplished by either randomly assigning all children in a given grade level or school to the respective classes (such as by choosing alphabetically, or every fourth name on a list, etc.), or by deliberately structuring classes such that a wide range of ages, abilities, achievement levels, socio-economic backgrounds, ethnic status, etc. is assured.

It should be emphasized that the homo- and heterogeneous grouping concepts are essentially relative points on the same continuum. That is, given that homogeneous grouping can theoretically occur only with respect to nominal variables (sex, skin pigmentation, eye or hair color, etc.), it seems evident that homogeneous grouping serves merely to reduce the range of individual differences with respect to continuous or ordinal criterion dimensions, while heterogeneous grouping tends to expand the range of individual differences on all dimensions.

Issues and Arguments

The debate between proponents of heterogeneous versus homogeneous grouping has been, in effect, over the issue of ability grouping. Both practices and studies of ability grouping in this country became common in the early 1920's, with the development of standardized group measures of intellectual performance. After a decline from the mid-1930's through the '40's, there has been a recurrence of interest in ability grouping that has tended to coincide with an increased public concern with academic achievement, particularly in mathematics and science (Goldberg, 1963).

The variety of reasons consistently offered with respect to the relative merits of ability grouping are by now well-known to most educators. The rationale for homogeneous ability grouping, not necessarily based on research findings (NEA, 1968), generally includes the following points: ability grouping takes individual differences into account by allowing pupils to advance at their own rate with others of similar ability, and by offering them methods and materials geared to their level; more individual attention from teachers is possible; pupils are challenged to do their best in their group, or to be promoted to the next level, within a realistic range of competition; it is easier to teach to and provide materials for a narrower range; teachers in heterogeneous groups tend, because of these difficulties, to teach to the average or below-average.[1]

On the other hand, the usual arguments for heterogeneity include these: homogeneous ability grouping is undemocratic and affects the self-concept of all children adversely by placing a stigma on those in lower groups while giving higher-group children an inflated sense of their own worth; adult life experiences are not ability-grouped, and pupils must learn to work with a wide range of people; pupils of lesser ability may profit from learning with those of greater ability; it is impossible to achieve truly homogeneous grouping, even along a single variable, since test data are not generally reliable or valid enough for this type of distinction; and finally, homogeneous grouping may provide less sensitivity to individual differences in children by giving the teacher the false sense that pupils are similar in social needs, achievement and learning style, while heterogeneity permits different patterns of abilities to emerge within a group of children (NEA, 1968).

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[1] It seems clear from the above that proponents of the ability grouping rule of school and classroom organization emphasize the instructional advantage of the practice. Although experimental support for this belief is not available for analysis, data recently collected by the investigator will be presented below (see Chapter IV).

Further arguments and retorts can be put forth for either side of this controversy. One would have hoped that research in ability grouping might have clarified and settled some of these issues--certainly there have been a great deal of such studies since the 1920's (see bibliographies on and reviews of the subject listed at the end of this paper). It is not the intention of this study to do a further review of the research. However, a few summarizing points will be made.

Summary of Research

First, the criteria for grouping pupils in studies which examine the effects of ability grouping range from reading achievement (various measures) to intelligence, to achievement on the arithmetic concept subtest of the Iowa Test of Basic Skills. The 1968 NEA Research Summary on Ability Grouping points out a number of the inadequacies of existing measures used as criteria for grouping. Basing groups on intelligence tests assumes comparability of mental age and ability, as well as uniform level of abilities in any one individual. Reading tests may not measure functional reading ability or take into account the variety of factors that influence an individual's reading score. Particularly in young children, it is doubtful that division by ability will be very accurate or valid. Heathers (1969) summarizes the issue succinctly:

> . . . students' characteristics as learners are not adequately represented by their scores on a general intelligence test. A student's ease and rate of learning vary greatly from one

> learning task to another. Also, his level of achievement varies considerably from one curriculum area to another and from topic to topic or task to task within each area (p. 564).

The dependent measures employed in studies of ability grouping present further problems. Most examine the effects of various grouping practices on academic achievement measured by standardized tests. Some use measures of attitude and personality development, social learnings, adjustment to school, or teacher reaction. Only a few, however, have used a multivariate approach to examine differential effects of ability grouping along a number of dimensions (Goldberg, 1966). Hence, it has rarely been the case that any of the "common sense" arguments made for or against homogeneous grouping have been tested empirically.

In addition, the major purpose of reducing the range of ability in any classroom is, ostensibly, to provide more easily for individual differences. Research studies rarely specify, however, the ways in which instruction is to be adapted or modified from group to group. It is generally implied that either the curricular programs, the methodology, or the pace will be varied. Yet, there appear to be no studies which measure instructional practices, whether these practices are to be kept constant or varied over experimental and control groups.

There is some evidence indicating that ability grouping might widen the gap in attainment between rapid and slower learners, gains in higher ability groups being offset by losses in lower ones (Daniels, 1961; Douglas, 1964). Further and more recent studies point to detrimental effects, particularly in low-ability groups (Borg, 1966; Eash, 1961; Heathers, 1969). Despite the questionable nature of Rosenthal's (1968) data on the effects of teacher expectation on pupil achievement, there is certainly the strong possibility that a "self-fulfilling prophecy" is at work when groups are labelled evaluatively. Conversely, there appears to be little evidence that high-ability pupils suffer in heterogeneous classes (NEA, 1968).

Goldberg, et al. (1966) summarize some of the many difficulties of interpreting research in ability grouping. They point out that studies vary considerably in their range of objectives, in the basis for determining "homogeneity," in duration, in adequacy of selection bases and means of matching experimental and control groups, in numbers of students, numbers of groups, size of classes, in differentiation of curricula and teaching method, in instruments and techniques used in assessing changes in students, in the training of teachers for various groups, and that studies have generally failed to examine effects of grouping on teachers and administration.

If it is assumed that the variables indicated above, either independently or in combination, affect student achievement, then not controlling for these variables in studies of ability grouping tends to minimize the difference in variance between or among ability groups, which tends to reduce the likelihood of finding statistically reliable differences. With this perspective, then, it is not surprising to find that research results are inconclusive. No clear and consistent effects on academic achievement have been found. Effects on pupils' attitudes towards themselves and towards school are also ambiguous. However, regardless of the outcome of any particular study, teacher attitudes invariably favor homogeneous grouping, despite Goldberg's finding that most teachers in their sample were more effective (measured by pupil achievement) in handling a wide range of ability in only one or two subject areas than in teaching all subjects to one level (Goldberg, 1966).

In short, if the major educational objective of classifying children into restricted range classroom environments is "greater provision for individual differences," and given that there is no clear-cut evidence indicating that this objective has been realized, then one is compelled to entertain the conclusion that ability grouping, as presently implemented, has failed to establish its merit as a sound instructional policy. In this, the investigator seconds the conclusion put forth in the 1968 NEA report: "Despite its increasing popularity, there is a notable lack of empirical evidence to support the use of ability grouping as in instructional arrangement in the public schools (p. 44)."

As indicated earlier, relatively little attention to the consequences of the ability grouping policy for children with respect to ethnic and socio-economic separation is evident in the educational literature. Yet, according to Racial Isolation in the Public Schools (U.S. Commission on Civil Rights, 1967), the policies and practices of school systems have an impact on racial concentrations in city schools. "These policies and practices are seldom neutral in effect. They either reduce or reinforce racial concentration in the schools (p. 39)." For this reason, the data on the relationship between ethnic and socio-economic status versus achievement on standardized tests generally used to classify children will be presented. If it can be demonstrated that larger proportions of children of particular ethnic and socio-economic groups generally tend to appear at the lower end of the distributions of various standardized measures of achievement, then it seems reasonable to expect that higher proportions of these children will be assigned to the lower ability groups, and that such groups must necessarily be ethnically and/or socio-economically isolated from those ethnic and socio-economic groups which, proportionately, tend to appear at the upper end of the score distribution.

CHAPTER II

SOCIO-ECONOMIC AND ETHNIC STATUS IN RELATION TO TEST PERFORMANCE

Given the findings that pupil performance on standardized achievement tests is frequently used as the criterion for classifying children into ability groups, and that the extent of ability grouping as an educational policy is presently widespread and is likely to be extended, then evidence bearing on the relationship between ethnic and socio-economic status and achievement on standardized measures should be examined to determine the extent to which the practice of homogeneous ability grouping is likely to separate children along ethnic and socio-economic lines. The following does not claim to be an exhaustive presentation of the research bearing on the issue. Rather, it is intended to present some recent reviews of the literature which suggest that there is a clear relationship between ethnic and socio-economic status and school achievement as measured by standardized tests.[1]

Numerous studies have been conducted on the relative performance of various ethnic and socio-economic groups at the elementary (Engle, 1934; Knief & Stroud, 1950), junior high (Coleman, 1940; Miner, 1968), and high school levels (Campbell, 1955; Miner, 1968). In all, the studies cited used a wide variety of tests and measuring devices of school performance ranging from standardized achievement tests, school grades, and teacher ratings, to highest school grade attained and average age for grade level. According to Goldstein (1967):

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[1] The investigator should like to acknowledge the work of Bernard Goldstein, Low Income Youth in Urban Areas, A Critical Review of the Literature, 1967, Chapter II, and Robert P. O'Reilly, Racial and Social Class Isolation in the Schools, A Report to the Board of Regents of the University of the State of New York, December 1969, Chapter III, from which this section borrows heavily.

> It should come as no surprise to the informed reader that, by every conceivable measure, children of low-income families do not do as well in school as children from more affluent ones. The evidence has been presented in full and dramatic detail for the essentially white populations such as those in Elmtown [Hollingshead, 1962] or River City [Havighurst, 1962]; for the essentially Negro population of Harlem [HARYOU, 1964]; for the mixed population of Big City and New York City [Sexton, 1961; Sheldon & Glazier, 1965]; and for cities in general, by Conant [1961] (p. 37).

Socio-economic Status

Several sources suggest that social class status may have a greater influence on achievement than does intellectual ability as measured by standardized tests. McCandless (1967) summarized the data on the relative contributions of social status and intellectual ability to achievement and concluded:

> From the intelligence test differences between social classes, we would expect differences in school progress, middle- and upper-class children being expected to do better school work than lower-class children. The actual differences in academic achievement between social classes are even more dramatic than the differences in intellectual level. On the whole, lower-class children achieve less well in school than their intelligence tests predict they will, whereas middle- and upper-class children approach their academic potential more closely (p. 317).

With respect to secondary school, Goldstein (1967) notes another body of data, from Project Talent. Examination of these data in terms of socio-economic differences tends to confirm the thesis that socio-economic status is related to achievement. In this study, a two-day battery of tests and questionnaires was administered to 440,000 students in 1,353 high schools, "carefully selected to be representative of American secondary schools." The data indicated that, on the basis of a measure of general academic aptitude, males below the median were twice as likely as males in the top 20% to come from families possessing "only the necessities of life." Moreover, while over half of those in the lower 50% came from blue-collar families, less than one-third of those in the top 10% did so. Rather, about 57% of the latter group came from white-collar families, while only 15% of the students in the lowest 10% did.

In addition, Project Talent schools were classified into two relatively homogeneous income groups (middle and low). One such group consisted of 27 schools that served predominantly middle-income students in New York City, Philadelphia, Detroit, Chicago, and Los Angeles. According to Goldstein, "there is virtually no overlap of the middle two-thirds of the two populations, with low-income students consistently below middle-income students in the same school system." The data appear in Table 3.

Ethnic Status

Dreger and Miller (1964) in a review of studies comparing Negroes and whites published in the 1943-1958 period, state that Negroes score lower on both traditional and so-called culture fair tests of intellectual functions. As a general rule, Goldberg (1963) concluded that Negro children from low-income families achieve less well in school than do comparable white children.

In *Racial and Social Class Isolation in the Schools* (1969), hereafter referred to as RSCIS, it was concluded that racial differences in achievement are approximately of the same order as the IQ differences between whites and Negroes. Data from Coleman, et al. (1966) suggest an average difference in IQ of approximately one standard deviation between Blacks and whites at grades 6, 9 and 12 in the Metropolitan Northeast. For Negroes and Puerto Ricans, as compared to whites, Table 4 indicates the number of standard deviations below the mean in three achievement areas.

TABLE 3[a]

MEANS AND STANDARD DEVIATIONS OF SELECTED TEST SCORES OF STUDENTS IN LOW- AND MIDDLE-INCOME SCHOOLS IN FIVE LARGE CITIES

	Middle Income		Low Income	
Test, grade and sex	Means	S.D.	Means	S.D.
General information test--twelfth-grade boys	157.24	17.12	117.46	24.35
General information test--twelfth-grade girls	127.23	16.15	97.22	18.15
English test--tenth-grade boys and girls	78.12	7.06	66.56	6.98
English test--twelfth-grade boys and girls	84.82	5.21	76.34	5.80
Mathematics I--twelfth-grade boys and girls	8.84	1.46	6.07	1.50
Mathematics II--twelfth-grade boys and girls	11.47	2.43	7.80	2.21
Reading comprehension--twelfth-grade boys and girls	33.72	4.27	25.15	5.58
Creativity--twelfth-grade boys and girls	9.40	1.54	6.46	1.95
Abstract reasoning--twelfth-grade boys and girls	9.51	0.93	7.66	1.22
Science information--twelfth-grade boys	10.94	1.88	6.23	3.62
Mechanical information--twelfth-grade boys	12.33	1.17	8.55	2.38

[a] This table appears in B. Goldstein, Low Income Youth in Urban Areas, A Critical Review of the Literature (1967), p. 38.

TABLE 4[a]

VERBAL ABILITY, READING COMPREHENSION AND MATHEMATICS ACHIEVEMENT: NUMBER OF STANDARD DEVIATIONS BELOW THE MEAN FOR WHITES IN THE METROPOLITAN NORTHEAST IN GRADES 6, 9 and 12

	Grade level	Verbal ability	Reading comprehension	Mathematics achievement
Negro (Metropolitan Northeast)	6	1.0	.8	1.1
	9	1.1	.9	1.0
	12	1.1	.8	1.1
Puerto Rican	6	1.7	1.4	1.5
	9	1.3	1.2	1.2
	12	1.2	1.1	1.7

[a] This table was derived from Coleman et al., 1966, pp. 274-275, and appears in RSCIS, p. 110.

The data indicate that the relative differences in verbal achievement of Negroes and whites are constant from grades 6-9. According to RSCIS, data from earlier grade levels also indicate a difference of approximately one standard deviation in the achievement levels of whites and Negroes, Metropolitan Northeast.

Although the relative differences between Negroes and whites shown in Table 4 remain roughly the same at different grade levels for the Metropolitan Northeast, other data appear to indicate that these differences grow larger with successive grades. Table 5 presents data taken from Coleman showing the discrepancies in Negro and Puerto Rican grade level achievement relative to the achievement of whites in the Metropolitan Northeast. These data exemplify the widely cited interpretation of Negro-white achievement differences as showing an increasing divergence with years in school.

TABLE 5[a]

VERBAL ABILITY, READING COMPREHENSION AND MATHEMATICS ACHIEVEMENT: NUMBER OF GRADE LEVELS BEHIND THE AVERAGE FOR WHITES IN THE METROPOLITAN NORTHEAST IN GRADES 6, 9 AND 12

	Grade level	Verbal ability	Reading comprehension	Mathematics achievement
Negro (Metropolitan Northeast)	6	1.6	1.8	2.0
	9	2.4	2.6	2.8
	12	3.3	2.9	5.2
Change		(1.7)	(1.1)	(3.2)
Puerto Rican	6	2.7	3.1	2.8
	9	2.9	3.3	3.4
	12	3.6	3.7	4.8
Change		(0.9)	(0.6)	(2.0)

[a] This table was derived from Coleman et al., 1966, pp. 274-275, and appears in RSCIS, p. 110.

Goldstein (1967) observes that, although the instances are few, studies have come up with contrary findings. For example, Antonovsky and Lerner (1958) found that, on the basis of a class-matched sample of Negro and white students from lower socio-economic status, Negroes did as well academically as whites, dropped out of school less frequently, and enrolled more often in the College Preparatory course. And Goldberg (1963) further cautioned:

> Despite consistent differences in demonstrated intellectual and academic ability . . . there is a great deal of overlapping. In all studies there are some in the one group who resemble the other group far more than their own. And in all comparisons of lower- and middle-class children there is a sizable though smaller proportion of the former who score high on tests, do well in school, plan on advanced education and have a high degree of similarity to the school performance of middle-class children. Conversely, there are middle-class children whose motivation and performance are poor indeed (p. 81).

Nevertheless, it appears from the above, that, for the majority of the population, ethnic and socio-economic class variables consistently tend to be associated with school achievement as measured by widely used standardized tests. What this means with respect to the placement of children in elementary and secondary schools is the subject of Chapter III.

CHAPTER III

THE ETHNIC AND SOCIO-ECONOMIC COMPOSITION OF CLASSES ORGANIZED ACCORDING TO THE PRINCIPLE OF HOMOGENEOUS ABILITY GROUPING

> The causes of racial isolation in the schools are complex. It has its roots in racial discrimination that has been sanctioned and even encouraged by government at all levels. It is perpetuated by the effects of past segregation and racial isolation. It is reinforced by demographic, fiscal, and educational changes taking place in the Nation's metropolitan areas. And it has been compounded by the policies and practices of urban school systems (Racial Isolation in the Public Schools, 1962, p. 17).

With respect to the last source of isolation, the 1967 report of the U.S. Commission on Civil Rights noted that the policies and practices within school systems are seldom neutral in effect. Rather, they reduce, positively reinforce, or maintain ethnic and socio-economic separation in the schools. Several recent empirical studies clearly demonstrated how the educational policy of ability grouping tends to reinforce and, therefore, perpetuate ethnic and socio-economic separation. Note that in each of these studies, research is focused on a very specific dimension of instruction: the ethnic and socio-economic distribution of children within the classroom. These studies will now be presented in detail.

A Reanalysis of Coleman's Data

In his report to the U.S. Office of Education, McPartland (1968) investigated some of the possible ways in which school desegregation may affect secondary school Negro students. The data presented were based on and derived from the massive study by Coleman *et al.* (1966), Equality of Educational Opportunity. In making comparisons between Negro student bodies in situations characterized by varying proportions of white students, McPartland pointed out several ways of approaching the problem. First, one could look at the proportion of white students enrolled in the school attended by a Negro, as was the case in the RSCIS study. Second, one could look at the proportion of white students in the classes attended by a Negro. For purposes of this study, both bits of information are relevant, but we are further concerned with the educational policies and practices which determine the classroom placement of children.

The information collected from students in the Coleman study concerned: (a) students' program of study, (b) the particular courses in which students were enrolled, and (c) the track level to which they were assigned in their English classes.

Table 6 presents the percentage of ninth-grade students in majority white classes, by race, program of study, and percentage of white enrollment in their school. According to McPartland, "from this table it is clear that within schools of similar racial composition the program of study in which a student is enrolled has a strong influence on the chance that he will be in a majority white class (p. 96)." (Italics mine.) Generally, students enrolled in the College Preparatory Program are most likely to be in classes which are more than 50% white. Conversely, students in Vocational, Commercial, or Industrial Art Programs are least likely to have mostly white classmates. McPartland also points out that the schools which are exceptions to this generalization are those where only a small fraction of the student body is white. However, the reason is that in contrast to most other schools, "the white students in many of these predominantly black schools are among the poorest students in the

TABLE 6[a]

PERCENT OF NINTH-GRADE STUDENTS IN MAJORITY WHITE CLASSES, BY RACE, PROGRAM OF STUDY, AND PERCENT WHITE ENROLLMENT IN THEIR SCHOOL

Student's race		Student's program of study	Percent White in School				
			0-9	10-29	30-49	50-69	70-100
		Region 1					
Total	1.	College Preparatory	1.9	33.8	58.9	65.5	95.1
			(533)	(459)	(769)	(772)	(4554)
	2.	General	5.2	35.6	37.6	54.0	91.2
			(307)	(387)	(255)	(348)	(2162)
	3.	Vocational, Commercial or Business, Industrial Arts	3.4	32.5	26.2	38.0	90.2
			(643)	(545)	(623)	(586)	(1932)
	4.	(1) - (3)	-1.5	+1.3	+32.7	+27.5	+4.9
		Region 2					
Negro	5.	College Preparatory	2.2	16.5	32.2	41.9	88.0
			(452)	(187)	(255)	(179)	(133)
	6.	General	2.8	15.5	8.6	36.0	67.5
			(253)	(116)	(140)	(89)	(114)
	7.	Vocational, Commercial or Business, Industrial Arts	2.1	14.3	14.9	33.8	69.7
			(514)	(210)	(275)	(201)	(99)
	8.	(5) - (7)	+0.1	+2.2	+17.3	+8.1	+19.3

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[a] This table is taken from James McPartland, The Segregated Student in Desegregated Schools. Sources of Influence on Negro Secondary Students, p. 95.

school (p. 97)." Therefore, except for predominantly Negro schools with a few white students, the practical consequence of program assignments within schools on the racial composition of a Negro student's classes is the same. Students who tend to achieve in academic areas (i.e., as measured by various reading and arithmetic achievement tests), tend to be selected or enroll in advanced academic programs which tend to have more white classmates in academic courses of study.

McPartland presents additional data which highlight the relation between program of study and classroom racial composition. That is, within schools of similar racial composition, black children in mostly white classes are most frequently enrolled in Vocational, Commercial, Industrial Arts, or Home Economics curricula. Says McPartland:

> The most dramatic positive differences with the fewest reversals are for courses which are likely to be part of a college preparatory program rather than some other program; the science and foreign language courses. But even for the course work likely to be required for most students, such as English and mathematics, there is some evidence that enrollment in these subjects is related to the racial composition of a Negro student's classmates. It is with courses such as mathematics and English that *separate* classes will be organized according to the achievement level of students to be assigned to the class (p. 99). (Italics mine.)

Finally, with respect to the racial composition of *classes* as a direct result of tracking or ability grouping, Table 7 indicates that the largest proportion of the students in the highest track have mostly white classmates. That is, half of all black children in the high English track have more than half white classmates in schools which enroll 50-69% whites, while approximately 33% of the Negro students in the middle and lowest tracks are in such classes.

Plainfield, New Jersey Study

In a second study of the problem, a research team from Teachers

TABLE 7[a]

PERCENT OF NINTH-GRADE STUDENTS IN MAJORITY WHITE CLASSES, BY RACE, TRACK LEVEL, AND PERCENT WHITE ENROLLMENT IN THE SCHOOL

Student's race		Track level of student's English class	Percent White in School				
			0-9	10-29	30-49	50-69	70-99
		Region 1					
Total	1.	Highest	3.8	35.4	52.2	71.5	92.7
			(447)	(443)	(464)	(562)	(2059)
	2.	Middle	3.6	33.5	34.7	49.4	91.2
			(944)	(806)	(852)	(969)	(4207)
	3.	Lowest	7.5	26.7	30.5	36.9	86.7
			(93)	(120)	(105)	(168)	(483)
	4.	(1) - (3)	-3.7	+8.7	+21.7	+34.6	+6.0
		Region 2					
Negro	5.	Highest	3.1	24.1	30.0	50.0	70.8
			(291)	(170)	(183)	(118)	(72)
	6.	Middle	1.6	17.2	14.6	33.4	72.0
			(845)	(313)	(343)	(326)	(218)
	7.	Lowest	4.0	16.7	22.0	32.8	66.7
			(74)	(36)	(50)	(61)	(27)
	8.	(5) - (7)	-0.9	+7.4	+8.0	+17.2	+4.1

[a] McPartland, The Segregated Student in Desegregated Schools . . . , p. 103.

College, Columbia University gathered data which tend to confirm McPartland's findings. These data will be presented below and represent all elementary, intermediate (grades 5 and 6) and junior high, and high schools in the Plainfield, New Jersey school system (1966).

With respect to the socio-economic status of children in Plainfield's junior and senior high schools, it was reported in a supplemental study undertaken by the research team that there existed a clearly significant socio-economic difference between the families of the Black and white students, such that (a) Black children were less often from families in which both mother and father were present, and (b) number of years in school and level of occupational status favored the fathers of white children. And with respect to the ethnic distribution in the junior and senior high schools, the data indicate that Blacks and non-Blacks are relatively equally distributed.[1] The data appear in Table 8.

Procedures for Assigning Children to Classes

The procedure governing the organization of classes in elementary and intermediate schools was as follows. Information regarding students' reading level, discipline status, racial status, and sex, was gathered by teachers. Principals then attempted to organize self-contained classes, according to the principle of balanced representation of children in each classroom.

In the two intermediate schools, heterogeneous grouping was practiced with a more concerted effort to group children for reading and mathematics in a departmentalized type of arrangement. That is, for the reading and arithmetic activities, the self-contained classroom found in the elementary schools was abandoned in favor of a departmentalized plan in which the teachers in the three heterogeneously grouped classes worked together in providing instruction.

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[1] The report did not include data on the ethnic and socio-economic composition of classes in the elementary and intermediate schools. However, it was indicated that there existed a racial and socio-economic balance in these schools and on grades within the schools.

TABLE 8[a]

ENROLLMENT BY SCHOOL AND RACE, PLAINFIELD, NEW JERSEY (APRIL 1, 1969)

School and/or grade	Black	Other	Total
Junior High 1	551	496	1,047
Junior High 2	644	307	951
High School: Total	751	869	1,620
Grade 10	298	303	601
Grade 11	246	272	518
Grade 12	197	293	490
Special Education	10	1	11

[a] This table is derived from data presented in the Plainfield Study.

In both junior high schools, incoming seventh-grade students were assigned to the W, X, and Y instructional groups for English, Social Studies, Mathematics and Science. Two criteria were employed in determining student assignment: (a) percentile ranking of the student in language and mathematics, and (b) the assessment of the student by his sixth-grade teachers and intermediate school principal. The measures of a student's English and Social Studies achievement were obtained from his performance on two widely used standardized tests--one measuring language ability (SCAT - Level 4) and the other achievement in vocabulary, reading, and other language arts skills (Iowa Tests of Basic Skills).

During the period 1965-1969, the seventh-grade English and Social Studies classes were established according to the following local percentile rankings for language:[1]

7W	70th-99th percentile
7X	30th-69th percentile
7Y	1st-29th percentile

For Mathematics and Science classes, the rankings were:[2]

7W	80th-99th percentile
7X	30th-79th percentile
7Y	1st-29th percentile

Given this information, the office of the Assistant Superintendent then furnished the recommended English, Social Studies, Mathematics, and Science groups into which the student was expected to be placed.[3]

This general procedure for assigning students to the three instructional groups was followed in the eighth grade. In the ninth grade, the pattern was the same, except for those students who elected an eighth-grade exploratory language course in Spanish, Latin, or French. These language classes are heterogeneously grouped. However, since ninth-grade language classes were grouped into W or X categories, the teacher's assessment of a student was really the determining criterion for placement. In contrast to the homogeneous grouping for Mathematics, Science, Social Studies, English, and ninth-grade language, there was heterogeneous grouping in all other courses (Art, Music, Industrial Arts, Homemaking, Physical Education, Homeroom, and Homeroom Guidance).

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[1] A student's overall language percentile ranking, computed by the office of the Director of Testing, was the average of the SCAT-L test in combination with the local achievement percentile rankings on the three different areas of the Iowa Test of Basic Skills.

[2] A student's science percentile ranking, computed by the Office of the Director of Testing, was the average of the SCAT-Level 4-Q test in Mathematics and the Iowa Test of Basic Skills in Arithmetic Concepts and in Arithmetic Problems.

[3] This assignment was not necessarily without appeal. Changes could be recommended if a student's sixth-grade teacher or the intermediate school principal or both recommended a change.

The consequences of the homogeneous policy with respect to classroom composition in the various subjects is detailed in Tables 9 and 10. Both tables are based upon the total of 308 students (218 Black and 90 white) that attend Hubbard Junior High School.[1] Table 9 presents the percentages of eighth-grade students assigned to each ability group by subject area and race.

TABLE 9[a]

PERCENTAGES OF THE HUBBARD JUNIOR HIGH SCHOOL BLACK
AND WHITE EIGHTH-GRADE STUDENTS, 1968-69,
ENROLLED IN W, X, AND Y ABILITY GROUPS
BY SUBJECT AREA

Subject	Race	Group W	Group X	Group Y	Total
English	Black	8.7	48.2	43.1	100.0
	White	58.9	34.4	6.7	100.0
Social Studies	Black	10.6	46.8	42.7	100.1
	White	55.6	38.9	5.6	100.1
Mathematics	Black	3.7	56.9	39.4	100.0
	White	42.2	51.1	6.7	100.0
Science	Black	2.8	58.8	50.0	100.1
	White	43.3	50.0	6.7	100.0

[a]This table appears in the Plainfield Study (1969), p. 53.

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[1] Excluded were 1 Oriental, 2 Puerto Ricans, and 1 student from India. Records were unavailable on several students. The official roster included 329 students (228 Black and 101 others) as of April 1, 1969.

TABLE 10

PERCENTAGE COMPOSITION OF W, X, AND Y ABILITY GROUPS, HUBBARD JUNIOR HIGH SCHOOL, EIGHTH GRADE, 1968-69 (BY RACE)

	Group and Race								
	W			X			Y		
Subject	Black	White	Ratio	Black	White	Ratio	Black	White	Ratio
English	26.4	73.6	.358	77.2	22.8	2.38	94.0	6.0	15.67
Social Science	31.5	68.5	.46	74.4	25.6	2.9	94.9	5.1	18.6
Mathematics	17.4	82.6	.21	72.9	27.1	2.69	93.5	6.5	14.38
Science	13.3	86.7	.153	73.8	26.2	2.82	93.3	6.7	13.93
Total	22.2	77.9	.285	74.6	25.4	2.937	93.9	6.1	15.39

In all subject areas, substantially higher proportions of white as opposed to Black children have been assigned to the highest ability (W) groups (average differences across subject +43.6%). The report notes that the proportions are more comparable in the X groups (middle range), but again, in all areas, a higher proportion of the Black students than of the whites are enrolled. Finally, in the lowest ability groups (Y), the differences are dramatic across all subject areas, with the average difference across subjects equal to 37.4%. It should be emphasized that the greatest percentage of overlap between Blacks and whites falls in the middle range of standardized score distributions. This overlap is clearly reflected in the comparability of proportions shown in column X of Table 9. Similarly, the greatest difference in the proportions of Blacks and whites achieving comparable scores is at the extremes of standardized score distributions. This is reflected in columns W and Y of Table 9.

Table 10 presents a second view of the data in Table 9 that tends to confirm this trend. Here, the racial composition of all students enrolled in each ability group is described for each subject area. The clearest confirmation is presented in columns indicating the ratio of Blacks to whites found in the various ability groups. Given that the ratio of Blacks to whites in the school population is 2.4:1, it is clear the greatest discrepancy is represented in the highest and lowest ability groups while the greatest comparability is represented in the middle group.

Shifting attention to the policies and practices of the Plainfield High School, the Report noted that homogeneous ability grouping is the rule governing class placement. Incoming tenth-grade students are placed in W, X1, X2, and Y groups for English, Social Studies (elective), Mathematics, Science, and Foreign Language. The top 25% of the grade is assigned to the W group; X1 represents the second quarter; X2 the third quarter; and the lowest 25% are assigned to Y group. Group classification is once again based on standardized test scores and teacher assessment of student classroom performance, with "more emphasis on the latter." The tests used are the SCAT-Level 3, Iowa Tests of Basic Skills taken in the eighth grade, and the Otis Quick-Scoring Mental Ability Test (Grammar Test), taken in the ninth grade.

Eleventh- and twelfth-grade students follow a pattern similar to that of tenth graders. However, in addition, in English and History particularly, there was substantial subdividing beyond the levels mentioned above. Special advanced groups were created, such as English II sp and U.S. History II Sp. The Report notes that this practice could reflect a subdivision of the W level. Further, in several cases the X level was divided into X1 and X2 and, in a few instances, the lower level students in the Y category were placed in a separate group. Consequently, in some grades and subject areas, there were as many as six levels of ability grouping rather than three. Tables 11 and 12 present data indicating the consequences of these special classes.

Turning our attention to the extreme right-hand column of Tables 11 and 12 (grade by grade) it is clear that there is a substantial reduction in the percentage of white students from the high to the low ability groups. However, the total percentage of white students in the school increased from grade 10 to 11 and from 11 to 12. Considering this factor, it was pointed out that,

> . . . were there a complete random distribution of students to classes, one might expect to find 50 per cent White students in grade 10 classes, 53 per cent White students in grade 11 classes, and almost 60 per cent White students in grade 12 classes. Keeping these differences in mind, it will be noted that the actual percentage of Whites (interpreting Whites as

> other than Black students), vary substantially from what a random distribution would produce. There is a clear shift from 83 to 90 per cent Whites in the W groups for the three years to 11 to 27 per cent White students in the Y groups for the three years. Further, differences between X1 and X2 groups for each of the three years substantiate the same tendency (p. 69).

TABLE 11[a]

NUMBER OF CLASSES, AVERAGE AND RANGE OF CLASS SIZE, AND PERCENT OF WHITE STUDENTS BY GRADE AND LEVEL IN UNITED STATES HISTORY, MAY 1969

Level	Number of classes	Average class size	Range class size	Percent white
11 Sp	1	17	--	100
11 W	4	19	15-22	88
11 X1	6	21	9-27	76
11 X2	5	23	18-27	50
11 Y	4	20	16-26	18
12 Sp	1	17	--	100
12 W	2	20	17-23	92
12 X1	7	20	9-25	72
12 X2	6	24	14-32	46
12 Y	2	22	17-26	21

[a] This table appears in the Plainfield Study (1969), p. 71.

In summarizing the data derived from the Plainfield Study, homogeneous ability grouping was practiced in the junior and senior high schools. It was found that student achievement as measured by performance on standardized tests of achievement, resulted in the segregation of children according to ethnic and socio-economic status. The extent of

TABLE 12[a]

NUMBER OF CLASSES, AVERAGE AND RANGE OF CLASS SIZE, AND PERCENT OF WHITE STUDENTS BY GRADE AND LEVEL IN ENGLISH, MAY 1969

Level	Number of classes	Average class size	Range class size	Percent white
10 W	5	22	20-32	83
10 X1	7	23	13-30	62
10 X2	7	23	11-31	39
10 Y	6	19	12-26	11
11 Sp	1	15	15	100
11 W	4	20	13-25	89
11 X1	6	24	13-31	74
11 X2	[b]	23	17-27	40
11 Y	5	22	18-26	11
12 Sp	1	15	15	100
12 W	4	22	19-25	90
12 X1	[b]	24	18-29	75
12 X2	[b]	25	20-30	47
12 Y	5	15	9-20	27

---

[a] This table appears in Plainfield Study (1969), p. 70.

[b] Data not reported in Plainfield Study.

differentiation and the extent of segregation are substantially more severe at the high school level than at the junior high school level as a direct result of the institution of "special" classes for the very high and low test achievers. However, on the elementary and intermediate levels classes were organized so as to reflect a distribution of students that was racially (and consequently), socio-economically balanced.

The Case of Hobson v. Hansen

The third source of data addressed to the ethnic and socio-economic consequences of homogeneous ability grouped classrooms is provided in a litigation involving the Washington, D.C. school system, Hobson v. Hansen (Congressional Record, June 21, 1967).

The Washington, D.C. school system used a system of tracking that was based completely on ability classification as measured by standardized tests. Accordingly, students at both the elementary and secondary school levels were classified into separate, self-contained curricula or "tracks" ranging from "Basic" for the "slow" student to "Honors" for the gifted. The educational content ranged from the very basic to the very advanced according to track placement. In the elementary and junior high schools three levels were used: Basic or Special Academic (for "retarded" children), General (for average or above average students), and Honors for the gifted. In the senior high schools a fourth track (regular) was added for college preparatory training of above average students.

Evidence relating to the consequences of the track system, regarding the distribution of lower-class and Negro students in elementary and secondary schools (1964-65, 1965-66) is presented in Tables 13 through 15.

In reviewing the data regarding the pattern of socio-economic

TABLE 13

THE RELATIONSHIP BETWEEN TRACKING AND THE SOCIO-ECONOMIC SEPARATION OF CHILDREN IN HIGH SCHOOL

Income level	Number of schools	Percent students in special academic and general tracks	
		1964	1965
High	3	7.8 to 34.6	8.1 to 40.1
Middle	4	44.8 to 62.7	43.9 to 63.0
Low	4	67.5 to 85.5	64.8 to 87.9

TABLE 14

THE RELATIONSHIP BETWEEN TRACKING AND THE SOCIO-ECONOMIC SEPARATION OF CHILDREN IN JUNIOR HIGH SCHOOL

	Percent in special academic		Percent in honors	
Income level	1964	1965	1964	1965
High	2.5 - 8.5	0 - 10.0	41.0 - 7.2	44.0 - 6.5
Middle	6.6 - 23.3	4.1 - 13.0	8.7 - 0	5.9 - 0
Low	12.3 - 36.0	5.8 - 28.1	7.4 - 0	7.3 - 0

TABLE 15

THE RELATIONSHIP BETWEEN TRACKING AND THE SOCIO-ECONOMIC SEPARATION OF CHILDREN IN ELEMENTARY SCHOOL

Median income range	Number of schools	Number with honors tracks	Percent
Under $3,000 to $4,999	60	3	5.0
$5,000 to $6,999	40	6	15.0
$7,000 to $10,999	22	14	63.6
$11,000 and over	8	6	75.0
Total	130	29	22.2

separation in the schools as a direct result of tracking, the court noted the following:

> 1. Grouping the high schools into three economic levels--high ($7,000 to $10,000), middle ($5,000-$6,999), and low ($3,000-$4,999)--the correlation between track placement and income is exact. [See Table 13.][1]
>
> 2. The economic correlations found in the high are also found, generally, in the junior high schools. [See Table 14.] The percent of students in either the Special Academic (for "retarded students") or Honors Tracks does not show an exact correlation with income level. But as a general matter, the enrollment range in the Honors Track does reflect a definite *upward* trend the higher the income level; conversely, Special Academic enrollment *decreases* as income level goes higher. . . . The correlation continues at the elementary school level as indicated in Table. . . . [See Table 15.]

Given the above, the court concluded that a student's chance of being selected for one of the higher ability tracks is "directly related to his socio-economic background."

With regard to the pattern of racial separation in the schools, the court noted that, for a majority of District schools and school children, race and economics are intertwined:

> (W)hen one talks of poverty or low-income levels one inevitably talks mostly about the Negro. This is evidenced by the most recent census data for the District of Columbia (1960) which shows the median annual income level to be $5,993 of all families; but for white families the median is $7,692, whereas for Negro families it is $4,800. At least 50% of the Negro population can therefore be placed within a poverty range.

The court cited further evidence of the relationships in carefully examining the racial and socio-economic patterns found in the junior and senior high schools.

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[1] This and all subsequent quotations and data referring to the Washington, D.C. school system are taken from Hobson v. Hansen.

1. Of the 11 senior high schools, eight (72.6%) serve neighborhoods with income levels of $6,000 or below, the average being $4,000. The per cent Negro enrollment in those schools, using the 1965 figures, ranged from a low of 74.0% to a high of 100.0%; the average was 93.5%.

2. The two schools with a significant number of white students enrolled are Wilson (93.7%) and Western (47.5%). The median income level of Wilson is $10,374; of Western, $8,649. . . . It is also instructive to note that Wilson, the only predominantly white school, had all but 8% of its students in the Regular and Honors Tracks in 1964 and 1965; no other school was even close to that. The school that was closest was Coolidge High School, a predominantly (90.0%) Negro school serving a neighborhood with the third highest income level in the system ($7,650); but despite its relative affluence Coolidge nonetheless had almost 40% of its students in the lower, non-college preparatory tracks.

3. Of the 24 junior high schools whose income level is known, 16 were at or below the $6,000 mark, the average being about $4,700. In 1965 the per cent Negro enrollment in those schools ranged from 63.5% to 100.0%; the average was 96.5%.

4. In 1964 there were six schools having from 99.0% to 17.0% white enrollment, all six had Honors Tracks (whereas 40% of the schools did not). At least two of those schools were in the middle income range (one at $5,000-$5,999 and one at $6,000-$6,999; in addition, Jefferson was among the six schools and presumably fell within the middle range). There were six other middle income schools, all having virtually all-Negro student bodies (the range going from 95.4% Negro to 99.9%); only three of them had Honors Tracks. And in 1965, this number dropped to two.

In reference to the distribution of track offerings in the elementary schools Table 16 indicates that as the proportion of Negroes in a school increases, the average income level decreases as does the proportion of schools offering the Honors Track. This pattern found to exist in elementary schools, also existed in the Junior high school.

Notwithstanding the evidence presented above, the court uncovered data which conclusively illustrates how ability grouping practices result in the ethnic and socio-economic separation of children. Looking at the evidence concerning the racial breakdown of the enrollment in the Special Academic Track (see Table 17), the court noted that at both the elementary and junior high school levels the proportions of Negroes enrolled in the lowest track exceeded their proportionate representation in the total student body. On the other hand, the proportion of whites enrolled in the Special Academic Track was significantly lower than the proportion of whites in the total school enrollment. It seems clear from the above that as a general rule, in those schools with a significant number of both white and Negro students, a higher proportion of the Negroes will go into the Special Academic Track (for "retarded students") than will white students.

TABLE 16

DISTRIBUTION OF TRACK OFFERINGS IN ELEMENTARY SCHOOLS
ACCORDING TO ETHNIC AND SOCIO-ECONOMIC
STATUS OF STUDENTS

Percent Negro enrollment	Average income level	Number of schools	Having special academic track		Having honors track	
			Number	Percent	Number	Percent
85 to 100	$5,000	108	88	81.5	13	12.0
67 to 85	5,500	4	3	75.0	2	50.0
33 to 67	8,100	7	3	72.0	3	42.0
15 to 33	7,100	3	2	67.0	2	67.0
0 to 15	11,400	11	None	0.0	9	82.0

TABLE 17

PERCENTAGE OF BLACKS AND WHITES ENROLLED IN SPECIAL ACADEMIC
TRACKS IN RELATION TO PROPORTIONATE
REPRESENTATION IN STUDENT BODY

Level	School year	Total school enrollment		Ratio of Negroes to whites in Special Academic Track	
		Percent Negro	Percent white	Percent Negro	Percent white
Elementary	1964	89.5	10.5	95.0	5.0
	1965	91.0	9.0	95.0	5.0
Junior high	1964	87.6	12.4	94.7	5.3
	1965	89.5	10.5	96.4	3.6

In summarizing the evidence, it was argued that the track system is by definition a "separative" educational policy, ostensibly according to students' ability level. Nevertheless, the practical consequence of ability grouping is to segregate students largely according to their socio-economic status, and to a lesser but observable degree, to their ethnic status. In addition, the court pointed out the manner in which the concept and practice of ability grouping structures failure in black and lower socio-economic class children and further perpetuates de facto discrimination.

> Compounding and reinforcing the inaccuracies inherent in test measurements are a host of circumstances which further obscure the true abilities of the poor and the Negro. For example, teachers acting under false assumptions because of low test scores will treat the disadvantaged student in such a way as to make him conform to their low expectations; this acting out process--the self-fulfilling prophecy--makes it appear that the false assumptions were correct, and the student's real talent is wasted. Moreover, almost cynically, many Negro students are either denied or have limited access to the very kinds of programs the track system makes a virtual necessity: kindergartens; Honors programs for the fast-developing Negro student; and remedial and compensatory education programs that will bring the disadvantaged student back into the mainstream of education. Lacking these facilities, the student continues hampered by his cultural handicaps and continues to appear to be of lower ability than he really is. Finally, the track system as an institution cannot escape blame for the error in placements, for it is tracking that places such an emphasis on defining ability, of elevating its importance to the point where the whole of a student's education and future are made to turn on his facility in demonstrating his qualifications for the higher levels of opportunity. Aside from the fact that this makes the consequences of misjudgments so much the worse, it also tends to alienate the disadvantaged student who feels unequal to the task of competing in an ethnocentric school system dominated by white middle class values; and alienated students inevitably do not reveal their true abilities--either in school or on tests.

General Conclusions

Taken as a whole, the data indicate that homogeneous ability grouping on the basis of standardized measures of achievement or aptitude tests tends to systematically separate children along ethnic and socio-economic dimensions, and further, tends to negatively affect the quality of experience that can be provided in the classroom, particularly for children assigned to low ability groups. More specifically, due to the current relationship between ethnic and socio-economic status and student performance on standardized tests employed in assessing achievement, it seems reasonable to conclude that, structurally, homogeneous ability grouping tends to encourage and sustain the development of a self-fulfilling prophecy which systematically tends to restrict the range of opportunities and quality of experience that can be provided in the classroom. This clearly seems to be the case for children placed in low ability group environments. It is the purpose of Chapter IV to further illustrate the influence of environmental structure. Here, the patterns of instruction found in hetero- and homogeneous classes when that structure is compounded by a self-contained classroom organization will be examined. For this purpose, new data recently collected by the investigator which describe the teacher-student patterns of instruction in elementary school self-contained classrooms will be presented in detail.

CHAPTER IV

PATTERNS OF INSTRUCTION IN HOMOGENEOUS AND HETEROGENEOUS SELF-CONTAINED CLASSROOMS

It will be recalled that proponents of homogeneous ability grouping emphasize the educational value of the practice in that a more individualized approach to instruction is made possible when classes are homogeneous or represent a reduced range of ability. In that new data bearing directly on the accuracy of this belief will be presented below, some discussion of the principle of individual instruction is in order. In addition, the data will be preceded by a discussion of the organization of the schools and classrooms represented in the data.

Individual Instruction

The basic objective of individual instruction is to provide the learner with educational experiences which utilize his strengths to build new learning and/or to correct learning difficulties. Theoretically, this objective will be achieved when the experiences which are planned for the learner are tailored to match the particular set of strengths, disabilities, learning styles, etc., that the learner brings to the educational environment.

From a pedagogical standpoint, it would appear that the practice of individual instruction has the greatest chance of being implemented according to principle when the educational setting provides for:

a. frequent teacher-student contacts, which should help to provide the teacher with information about the learner, which in turn should facilitate planning for individual pupil success,

b. flexibility in the use of the educational environment so that individuals or small groups of children could participate in activities more closely related to individual needs, and

c. the opportunity for individual children to participate in a variety of situations which involve different children, materials, and teachers so that teachers may have the opportunity to observe the conditions under which a given child experiences success.

Of course, there are many other features of the total school environment which are related to the practice and success of individual instruction. For example, the quality and frequency of administrative support and supervision; the nature and extent of teacher competence; the degree to which teachers are able to plan together to analyze and work to solve the particular problems of individual children; the range of educational experiences that the school can physically make available to teachers, students, auxiliary personnel, etc., all play a role in determining the extent and quality of experience that can be provided for individual children.

It should be emphasized that individual instruction does not necessarily require that teachers work with children only in a one-to-one relationship, or that children work alone or with "individualized" commercial materials. On the contrary, the basic requirements are that teachers plan for and children engage in learning experiences which are suited to their particular sets of strengths, interests, styles, rates, etc. The extent to which these requirements are supported and encouraged by structures based on the principles of homo- and heterogeneous grouping should be of particular interest to educators concerned with providing children (particularly, the disadvantaged), with an equal educational opportunity.

Organization of Schools and Classrooms Represented in the Data

The basic pattern of vertical organization in the sample of urban elementary schools represented below prescribes that children of a given age be assigned to one of five grade levels (grades 1-5). The predominant pattern of horizontal organization assigns each child on each grade level to one of several self-contained heterogeneous or homogeneous classroom units (approximately four to twelve classes on each grade with average class registers ranging from approximately 22 to 30 children). The criteria used in assigning children to classes are usually standardized reading achievement tests and teacher judgment.

Given this two-fold organization, a teacher is assigned to each class on a given grade. The classroom teacher (who usually is assisted by a paraprofessional educational assistant), is charged with the sole responsibility of planning and implementing the curriculum for all children in his class for approximately four of the five hours that the children are in class each day. For the remaining one hour, a cluster teacher provides the class with a lesson (Art, Music, etc.). It should be noted that the purpose of the cluster position is to provide the classroom teacher with the time needed to evaluate the progress of the children and to plan the classroom experiences that comprise the basic curriculum. Consequently, when the cluster teacher arrives, the classroom teacher is relieved for a period of "unassigned professional activity."

In short, the predominant pattern of elementary school organization in the schools represented below, assigns children to grades on the basis of age and then to homogeneous or heterogeneous self-contained classes according to reading ability. Each class is the sole responsibility of one classroom teacher who is relieved 45 minutes each day (by a cluster teacher) for a preparation period. The children are in school for 360 minutes each day. The classroom teacher plans for and provides educational activities for 265 minutes, while the cluster teacher plans for and assumes responsibility for 45 minutes each day. The remaining 50-minute period is reserved for a lunch period that usually occurs sometime between 11:00 A.M. and 1:00 P.M. Data comparing the influence of this structure with regard to the patterns of classroom instruction will now be presented.

Data Comparing the Patterns of Instruction in Self-Contained Homogeneous and Heterogeneous Classrooms

Although experimental research addressed to the instructional consequences of homo- and heterogeneous grouping in self-contained classrooms is not available, data recently collected by the investigator indicate that the implementation of this structure in the urban elementary school classroom (grades 1-5) results in comparable pedagogical patterns of instruction. That is, regardless of the principle governing the composition of the classroom, teachers practicing within the structure of the self-contained classroom tend to manifest similar grouping and teaching patterns in presenting the various subject areas. This is not to say that by conventional statistical standards ($p < .05$), reliable differences never exist between heterogeneous and homogeneous self-contained classes, but that when statistical differences do exist the magnitude of the difference is of no pedagogical consequence.

The data presented below represent the observations and practices of 223 classroom teachers from 101 heterogeneous and 122 homogeneous classrooms in eight Special Service Elementary Schools in New York City. The information was reported as part of an interview-questionnaire developed by Esposito and Bernstein (1970) and collected during the course of the 1969-70 school year. Table 18 indicates that the data describe the observations and practices of a representative sampling of the teacher population across the eight schools according to type of classroom structure and grade level.

TABLE 18

NUMBER OF INTERVIEW-QUESTIONNAIRES RETURNED FROM HETEROGENEOUS AND HOMOGENEOUS SELF-CONTAINED CLASSES ACCORDING TO GRADE LEVEL

Grade level	Homogeneous	Heterogeneous
1	29	21
2	23	20
3	21	22
4	27	17
5	22	21
Not returned	24	26

Total chi square: 1.85
Exact probability: .767
Contingency coefficient: .091

Given the above information, the analysis reported below will compare the total heterogeneous sample to the total homogeneous sample across the eight schools and five grades involved in the survey.

As part of the interview-questionnaire each teacher was asked to indicate the number of children in his class which fell into each of five ability categories for each of nine subjects normally presented as part of the classroom curriculum. The ability categories were:

1. Excellent
2. Good
3. Average
4. Below Average
5. Poor Ability.

For example, in responding to the question with reference to reading ability, a given teacher would distribute all of his children into one or more (up to five) categories depending on the range of ability perceived as being represented in his classroom. If a category (e.g., Poor Ability) did not apply for a given class, a zero was indicated. Given this information, each category was considered to represent a range of 1.0, and the average range of ability represented for each subject was computed for all heterogeneous and homogeneous classes.

In addition, for each subject area, teachers were asked to indicate the number of instructional groups that the class was divided into when each subject area was presented to the children. For example, if the class was divided into 3 instructional groups for Reading, 2 groups for Arithmetic, and no group for Science (i.e., information presented to the class as a whole), a teacher would record 3, 2, and 1 respectively. The average number of instructional groups that the class was divided into for each subject was then computed. Finally, homo- and heterogeneous classes were compared with respect to four classroom dimensions:

TABLE 19

AVERAGE RANGE OF ABILITY AND NUMBER OF INSTRUCTIONAL GROUPS FOUND IN THE AVERAGE HOMOGENEOUS AND HETEROGENEOUS CLASSROOM

	Homogeneous								Heterogene			
	Range			Group			③ 1 v. 2		Range			Grou
Subject	① X	S.D.	N	② X	S.D.	N	t 2-tail		④ X	S.D.	N	⑤ X	S.D
Formal Reading	3.8	1.28	108	2.1	1.05	112	10.75**		4.3	.86	87	2.8	1.1
Science	3.8	1.27	94	1.1	.65	103	18.52**		3.5	1.30	61	1.2	.7
Music	2.2	1.17	86	1.0	.17	97	9.42**		2.4	1.34	61	1.2	.6
Language Arts	3.3	1.26	102	1.3	.64	102	14.29**		4.2	1.02	80	1.6	1.0
Art	2.7	1.15	98	1.1	.60	101	12.25**		3.0	1.30	64	1.2	.7
Arithmetic	3.3	1.28	104	1.6	.92	101	10.94**		4.0	1.00	85	2.1	.9
Social Studies	2.9	1.22	92	1.2	.73	99	11.58**		3.6	1.31	74	1.2	.6
Health & Safety	2.3	1.25	99	1.0	.31	92	9.01**		2.4	1.43	43	1.1	.6
Gym	2.4	1.22	77	1.2	.56	88	7.93**		2.4	1.15	40	1.2	.5
Total	3.1	1.25	92	1.4	.66	100	11.64**		3.5	1.11	66	1.7	.8

*$p < .05$

**$p < .01$

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		Heterogeneous								
		Range			Group					
N	③ 1 v. 2 t 2-tail	④ X	S.D.	N	⑤ X	S.D.	N	⑥ 4 v. 5 t 2-tail	⑦ 1 v. 4 t 1-tail	⑧ 2 v. 5 t 2-tail
112	10.75**	4.3	.86	87	2.8	1.11	91	10.10**	3.25**	4.58**
103	18.52**	3.5	1.30	61	1.2	.76	86	12.40**	1.42	.96
97	9.42**	2.4	1.34	61	1.2	.68	79	6.39**	.94	1.28
102	14.29**	4.2	1.02	80	1.6	1.03	91	16.56**	5.33**	1.60
101	12.25**	3.0	1.30	64	1.2	.73	83	9.94**	1.50	1.00
101	10.94**	4.0	1.00	85	2.1	.96	93	12.91**	4.22**	3.70**
99	11.58**	3.6	1.31	74	1.2	.68	88	14.23**	3.53**	0.00
92	9.01**	2.4	1.43	43	1.1	.69	69	5.57**	.39	1.12
88	7.93**	2.4	1.15	40	1.2	.59	70	6.15**	0.00	0.00
100	11.64**	3.5	1.11	66	1.7	.80	83	13.16**	2.19*	1.80

TABLE 20

BASIS ON WHICH INSTRUCTIONAL GROUPS ARE FORMED

Subject	Homogeneous			Heterogeneous			X^2	EP[a]	CC[b]
	Achievement	Other	None	Achievement	Other	None			
Formal Reading	95	8	0	78	9	0	.39	.543	.045
Science	50	9	2	38	8	2	.15	.929	.037
Music	38	7	3	34	8	3	.19	.908	.045
Language Arts	59	5	3	56	4	1	.91	.641	.084
Art	40	8	4	36	7	2	.44	.805	.067
Arithmetic	75	4	3	71	4	2	.15	.926	.031
Social Studies	47	9	3	43	6	3	.34	.846	.055
Health & Safety	40	3	3	31	5	3	1.07	.591	.112
Gym	36	10	2	34	11	4	2.21	.333	.157

[a] Exact Probability.

[b] Contingency Coefficient.

that exist in the heterogeneous and homogeneous classroom for all subject areas taken as a whole (see Table 18). It should be noted, however, that for Reading and Arithmetic, reliable differences do exist, although the difference amounts to less than one instructional group.

Table 20 indicates that for all subject areas, teachers in hetero- and homogeneous classes tend to group for instruction on the basis of students' ability to achieve in a given subject. Finally, in columns 2 and 5 of Table 19 a critical similarity between the homo- and heterogeneous classroom is highlighted. That is, regardless of the range of ability present in the average homo- and heterogeneous classroom, in neither classroom does one find a range of instructional groups that corresponds to the range of ability within the classroom. In fact, except for the formal reading activity (approximately 30-45 minutes per day), all instruction and activities engaged in by the teacher and children are "class" oriented with the teacher presenting the same set of information to the class as a whole. Given the range of talent that exists in the average classroom, it seems likely that children with particular sets of strengths and/or difficulties are not consistently presented with learning experiences which correspond to their individual styles, interests, learning rate, level, or ability. This inference is further supported by data presented in Tables 21 and 22 below.

These tables indicate that in response to the questions "Do all children/groups use the same material?" and "Do all children engage in the same activities?" teachers indicated that the tendency was for instruction to be uniform for all children regardless of the fact that teachers perceived a wide range of talent in the classroom, and regardless of whether classes are hetero- or homogeneously organized. Teachers were

TABLE 21

QUESTION: DO ALL CHILDREN/GROUPS USE THE SAME MATERIAL?

Subject	Homogeneous		Heterogeneous		X^2	EP[a]	CC[b]
	Yes	No	Yes	No			
Formal Reading	21	92	7	82	4.79*	.027	.152
Science	88	14	70	11	.00	.976	.002
Music	87	9	63	13	2.27	.128	.114
Language Arts	65	37	42	43	3.88*	.046	.143
Art	78	20	61	20	.47	.500	.469
Arithmetic	59	49	31	61	8.80*	.004	.205
Social Studies	87	12	69	19	3.02	.079	.126
Health & Safety	77	11	52	13	1.59	.205	.101
Gym	67	19	47	18	.63	.566	.064

*Significant. [a] Exact Probability. [b] Contingency Coefficient.

TABLE 22

QUESTION: DO ALL CHILDREN/GROUPS ENGAGE IN THE SAME ACTIVITIES?

Subject	Homogeneous		Heterogeneous		X^2	EP[a]	CC[b]
	Yes	No	Yes	No			
Formal Reading	31	79	25	67	.03	.868	.011
Science	86	11	69	13	.78	.619	.066
Music	83	7	64	11	2.00	.154	.109
Language Arts	67	31	48	37	2.76	.093	.122
Art	69	25	62	17	.60	.556	.059
Arithmetic	57	49	34	56	5.01*	.024	.158
Social Studies	86	11	74	12	.28	.601	.039
Health & Safety	78	5	56	11	4.20*	.038	.165
Gym	62	20	46	18	.63	.566	.064

*Significant.

[a] Exact Probability.

[b] Contingency Coefficient.

also asked if there was a particular reason why instruction tended to be class rather than small-group oriented. Table 23 presents data which suggest that teachers believe that there is no one prevailing reason or condition which causes class-oriented instruction.

TABLE 23

TEACHER REPORT AS TO REASON WHY INSTRUCTION TENDS TO BE CLASS ORIENTED

Reasons reported	Homogeneous	Heterogeneous
No particular reason	21	26
Space limitation	13	13
Limitation in materials	8	6
Not enough time to provide individual instruction	9	1
Lack of personnel	8	5
Certain subjects require the attention of the class as a whole	21	17
Discipline reasons	5	4
Other: No consistent theme	17	17

Total chi square 14.92
Exact probability .154
Contingency coefficient .208

In addition, Table 24 indicates that progress in the various subject areas in a homogeneous setting is comparable to that found in the heterogeneous setting.

Considering all of the information provided above, it seems clear that in the urban elementary school self-contained classroom, the patterns of instruction found in classes organized according to the

TABLE 24

QUESTION: PLEASE RANK EACH SUBJECT AREA IN TERMS OF THE NUMBER OF CHILDREN IN YOUR CLASS THAT ARE PROGRESSING VERY WELL IN THE SUBJECT

	Homogeneous					Heterogeneous							
Subject	1	2	3	4	5	1	2	3	4	5	X^2	EP[a]	CC[b]
Formal Reading	55	30	17	8	3	42	38	11	2	0	8.71	.069	.201
Science	37	46	18	5	3	23	36	12	6	1	1.68	.796	.094
Music	53	26	13	4	4	39	26	9	2	2	1.50	.829	.091
Language Arts	42	43	19	6	0	28	50	12	2	0	5.35	.147	.161
Art	51	34	14	3	3	41	30	9	2	2	.497	.971	.051
Arithmetic	48	36	19	8	2	24	51	14	1	1	14.92*	.005	.261
Social Studies	34	44	23	7	1	29	38	20	1	0	4.36	.361	.147
Health & Safety	44	32	15	4	2	40	18	4	2	2	5.45	.244	.180
Gym	46	26	14	4	2	40	13	2	3	2	7.49	.112	.217

Note:

Teaching Effectiveness: (Code)

1. 75% to 100% of my class is progressing very well in the subject.
2. 50% to 74% of my class is progressing very well in the subject.
3. 25% to 49% of my class is progressing very well in the subject.
4. 10% to 24% of my class is progressing very well in the subject.
5. Less than 10% of my class is progressing very well in the subject.

*Significant.

[a] Exact Probability.

[b] Contingency Coefficient.

principles of homogeneous and heterogeneous self-contained classrooms are very similar. That is, regardless of the principle governing the composition of the classroom, the essential pattern of teacher-student interaction manifested in the homogeneous classroom is comparable to that found in the heterogeneous classroom. Given this, it could be concluded that the self-contained classroom structure, regardless of the criteria employed in assigning children to classes, tends to encourage patterns of classroom instruction which fail to take into account the individual needs of children. Part II of this study will offer an interpretation of these findings, and in conjunction with the data presented in Chapters I through III, will explore the relevance of the various relationships, and outline a process by which environmental structure is thought to affect the character and quality of instruction that can be provided in an educational environment.

PART II. A BEHAVIORAL AND SYSTEMIC INTERPRETATION OF THE RELATIONSHIP BETWEEN STRUCTURE AND FUNCTION

CHAPTER V

A BEHAVIORAL-SYSTEMS FRAME OF REFERENCE

From the data presented in Part I, Chapters I through III, it seems clear that by design, as distinguished from intent, homogeneous ability grouping tends to systematically separate children along ethnic and socio-economic dimensions. The data also suggest that, as a direct consequence of that separation, a self-fulfilling prophecy of school failure is cultivated in low ability groups and, therefore, tends to restrict the range and quality of experience that is provided in the classroom. Given this, it seems justifiable to conclude that the principle of homogeneous ability grouping tends to have a systematic and negative effect on the character and quality of classroom instruction, particularly in low ability groups. Furthermore, information presented in Chapter IV illustrates that when the principle of homo- and heterogeneous grouping is compounded by the self-contained classroom structure, instruction tends to be oriented to large groups of children without regard for the needs of individual children. In view of this, it seems reasonable to inquire into the process(es) by which administrative and educational structures govern the classroom behaviors and related educational events which make up the teaching-learning process. More specifically, it will be the purpose of Part II of this paper to consider in what way a behavioral and systemic understanding of the relationship between structure and function helps to explain the instructional and related educational events manifested in the course of the teaching-learning process. In the course of this discussion several key principles of behavior modification will be presented and discussed within the context of a systems approach to the teaching-learning process.

Behavioral Frame of Reference

According to behavior theory, organisms manifest behavior in relation to the consequences of behavior (Skinner, 1957). For example, in a given situation, if an individual emits a behavior which is followed by a rewarding event (or set of events), that behavior will be reinforced and therefore tend to increase in rate of occurrence. If, on the other hand, the behavior is followed by a noxious event (or set of events), that behavior will be punished and therefore tend to decrease in rate of occurrence. Similarly, if an individual anticipates reward as a consequence of a given behavior, then that behavior will tend to be emitted. Alternatively, if punishment is anticipated, then that behavior will tend not to be emitted.[1] From these simple principles, behavioral change is conceptualized as a process whereby consequences of behavior are manipulated such that the emission of desirable behavior (or its approximation) is followed by a rewarding event, while the emission of undesirable behavior is followed by a punishing event or the absence of reward. Given the important role of reinforcement in the behavioral frame of reference, further discussion of this concept is in order.

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[1] This should not be interpreted to mean that the emission of a behavior is always the result of a deliberate choice on the part of an individual, but that given awareness of alternatives, deliberation related to the consequences of the alternatives is involved.

Basically, the concept of reinforcement describes a relationship between two responses (each having a probability of occurrence), such that the more probable response serves as a reinforcer for the less probable response (Premack, 1965). For example, given response A with a probability of occurrence of .50, and response B with a probability of .70, if the opportunity to engage in B is made contingent upon the occurrence of A, B will serve as a reward for the organism, and therefore increase the rate of occurrence of A. In practice this principle takes the form of, "If you engage in X behavior, you may then engage in Y behavior."

Two critical and related points should be singled out in a discussion of reinforcement. First, reinforcement does not refer to a thing or an object. Rather, it refers to an empirical relationship between responses. Money, for example, is not a reinforcer according to this definition. However, for most individuals in our society, collecting money, spending money, etc. are high probability responses in relation to many other behaviors and, therefore, serve to increase the rate of occurrence of such other behaviors. Second, the probability of occurrence for a given response is not an absolute value. Rather, it represents a value that is relative to the anticipated consequences of the behavioral alternatives available to an individual in a given situation at a given time. For example, given a financially impoverished individual at time 1, engaging in behaviors (e.g., work) followed by collecting and spending money would probably have a higher probability of occurrence than engaging in behaviors followed by reading a letter of thank-you that might be received as a result of work, time and effort devoted to a charity. Behaviorally, the former activity would probably generate a greater payoff for the individual than the latter, and consequently would most likely have a higher probability of occurrence. However, if this individual, as a result of some good fortune, becomes abundantly wealthy at, say, time 2, then the probability of occurrence of behavior related to helping charities could very easily exceed the probability of occurrence of behavior related to collecting money.

The above illustration should serve to point out that the probability of occurrence of a given behavior is related to the anticipated consequences of that behavior at a given time in a given situation.

For heuristic purposes, let us conceptualize reward and punishment as consequences of behavior which have positive and negative values. That is, for a given individual, rewarding events have positive values of between 1-10, and punishing events have negative values of between 1-10. In addition, let us assume that given the opportunity to emit behavior A and/or B and/or C . . . etc., in a given situation, an individual will emit that behavior (or set of behaviors) believed to result in the most rewarding and/or least punishing consequences. For example, given a self-contained classroom type of structure (with some finite number of choices available to the teacher regarding the pattern of organizing some 30 children for instruction), the teacher will select and implement that pattern of instruction which he believes will result in the most rewarding and/or least punishing consequences. Schematically, the relationship is presented in Figure 1.

From this model it is clear that the behavior (or set of responses) manifested by a given teacher, in a given situation at a given time, represents the end product of a screening process wherein the teacher "considers" the variety of alternatives and likely consequences of the

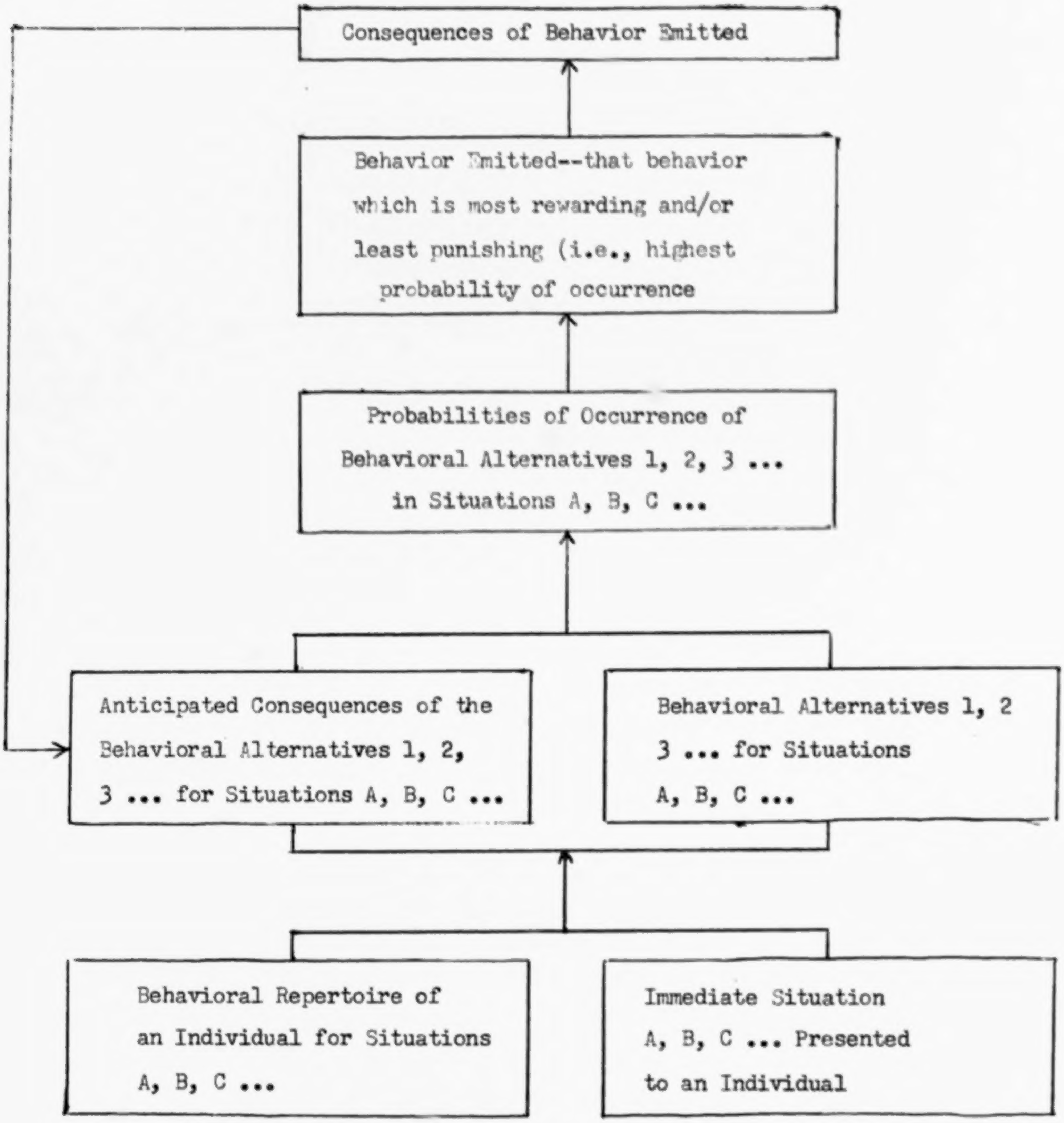
Consequences of Behavior Emitted
Behavior Emitted--that behavior which is most rewarding and/or least punishing (i.e., highest probability of occurrence
Probabilities of Occurrence of Behavioral Alternatives 1, 2, 3 ... in Situations A, B, C ...
Anticipated Consequences of the Behavioral Alternatives 1, 2, 3 ... for Situations A, B, C ...
Behavioral Alternatives 1, 2 3 ... for Situations A, B, C ...
Behavioral Repertoire of an Individual for Situations A, B, C ...
Immediate Situation A, B, C ... Presented to an Individual

Fig. 1. A Process Model of the relationship between the immediate situation and the behavior emitted in that situation.

alternatives, such that the behavior manifested is in anticipation of the most rewarding and/or least punishing consequences. In addition, the actual consequences of the behavior feed back into the process to affect the future probability of occurrence of the behavior. So, for example, if the teacher in situation S manifests behavior X which it is anticipated will be consequated with a rewarding event, and that behavior is consequated with a punishing event, the future probability of occurrence of behavior X in situation S would decrease. In addition, given the principle of stimulus and response generalization, one would expect behavior X (and behavior functionally related to X) not to be emitted in situation S or situations similar to S. If, on the other hand, behavior X is consequated with rewarding events, the probability of occurrence of behavior X (and behavior functionally related to that behavior) would increase. Similarly, according to the principle of generalization, one would expect behavior X to be emitted in situations similar to situation S. More concretely, if an individual finds that in a given situation, whistling (wolf-like) at young ladies is rewarded, then it is probable that behaviors functionally related to the behavior (or believed to be), will be emitted by the individual in that and similar situations. If these behaviors are also rewarded, the probability of similar behaviors increases and therefore the emission of similar behaviors becomes more likely. If, on the other hand, these behaviors are punished, the probability of occurrence of these events tends to decrease in value.

Let us reserve further discussion of these ideas and how they are related to the structural properties of an educational environment until after a discussion of how the teaching-learning process is conceptualized within a systemic frame of reference.

Systemic Frame of Reference

According to general systems theory, a system refers to a set of objects (in an environment) in mutual interaction, with the status of each object constrained by, conditioned by, or dependent on (a) the status of the other objects, and (b) the properties, functions, and purposes of the system itself (Haberstroh, 1965; Hall & Fagan, 1968; Kaplan, 1967). For our purposes, the concept of environment and its relationship to the properties, functions, and purposes of a system is of special importance. More specifically, Hall and Fagan (1968) point out that as a consequence of changes in the attributes of the environment, the system (as well as the objects whose attributes are changed by the system), may be changed. Figure 2 presents a diagram of these relationships which includes the concepts of input and output. An input is any measurable event (variable) or series of events occurring outside the system that influences the output (Haberstroh, 1965). An output is any measurable event (variable) or series of events that are immediately determined by the system (Haberstroh, 1965). According to Haberstroh, between the inputs and outputs, and inside the system, exists a transfer function (process) whereby inputs are transformed into outputs. Given this frame of reference, how is the individual learner and teacher conceptualized, as well as the interaction between these objects in the self-contained classroom structure?

The individual student may be classified as an input or as an output, depending on the point at which analysis is conducted. As an input, the individual student possesses certain attributes which, theoretically, contribute to the character of the teaching-learning process, and therefore partially determine the nature of the output of that process. As an output, the student may be thought of as a graduate of a given class or

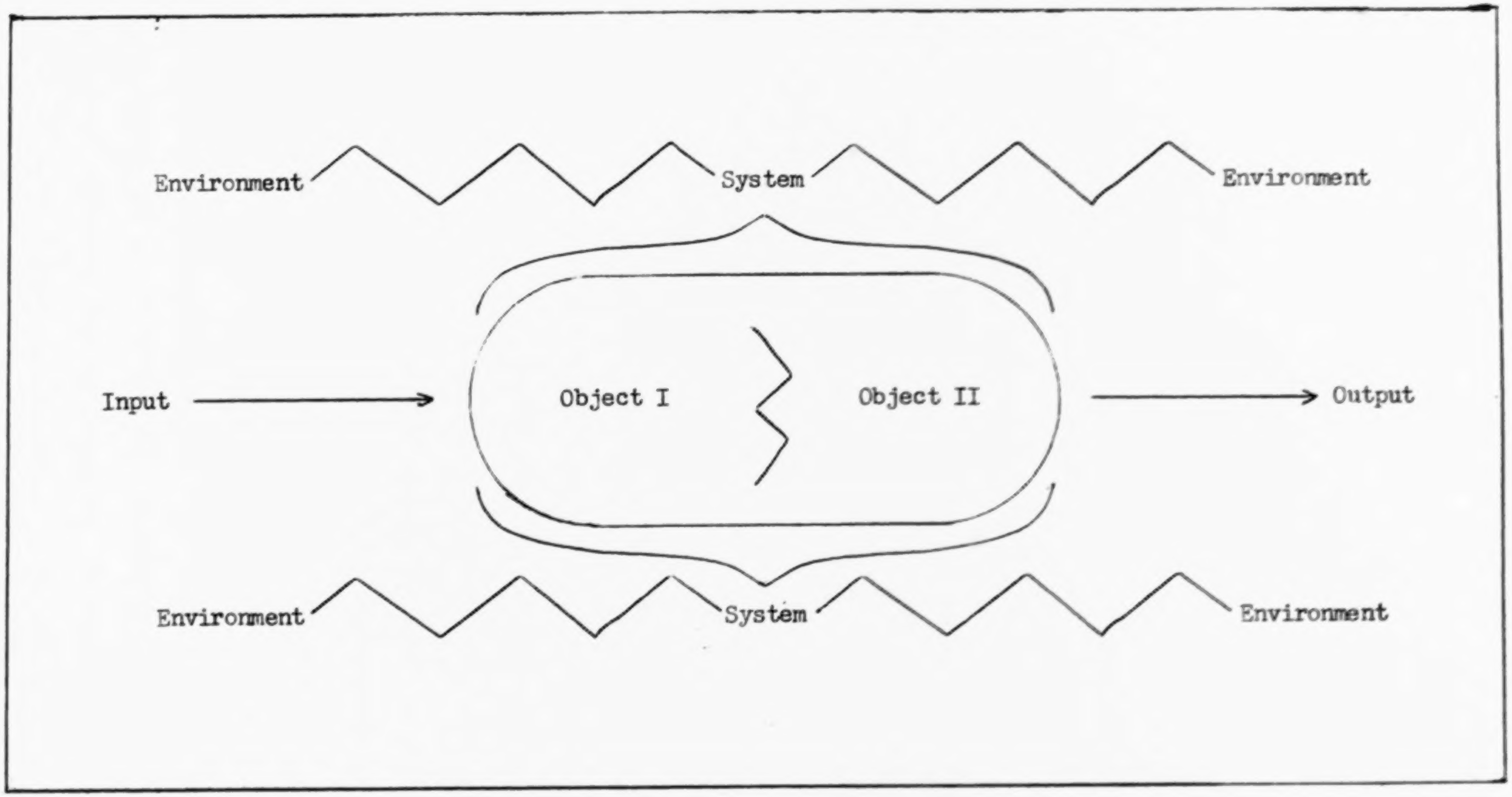
Environment
System
Environment
Input
Object I
Object II
Output
Environment
System
Environment

Fig. 2. A system in an environment. (Figure 2 is adapted from D. Mann, *Program for Situational Analyses: Conceptual Framework* (1969), p. 5.

school.

Similarly, the teacher may be conceptualized as an input insofar as he influences output via the teaching-learning process, and as an output insofar as he travels through a system and has teaching and other behaviors altered in the process. It is critical to note an important consequence of this conceptualization. Namely that in the teaching-learning process, the teacher and student are engaged in a dynamic and interdependent relationship. That is, in the teaching-learning process both objects relate to each other in ways that are partially determined by the status of the other, and by the results of previous interactions. Therefore, teachers and students could be classified as "endogenous" variables, that is, variables that actively participate in a system such that they influence other variables and are themselves changed in the process (Lave & Kyle, 1968). Figure 3 shows the interdependence of the teacher and student variables in a series of interactions.

In short, within the context of a systemic frame of reference, the teacher and student may be conceptualized as a set of objects in an environment with relationships between the objects and between their attributes. In addition, the immediate classroom environment per se (as well as the environment at large) has properties, functions, or purposes which may be distinct from (i.e., arbitrarily imposed upon) its constituent objects, relationships, and attributes, but, as will be demonstrated below, sustain the status of the system (teaching-learning process) operating in that environment.

Given the behavioral and systemic ideas presented above, how is structure conceptualized and what is its relationship to the teaching-learning process?

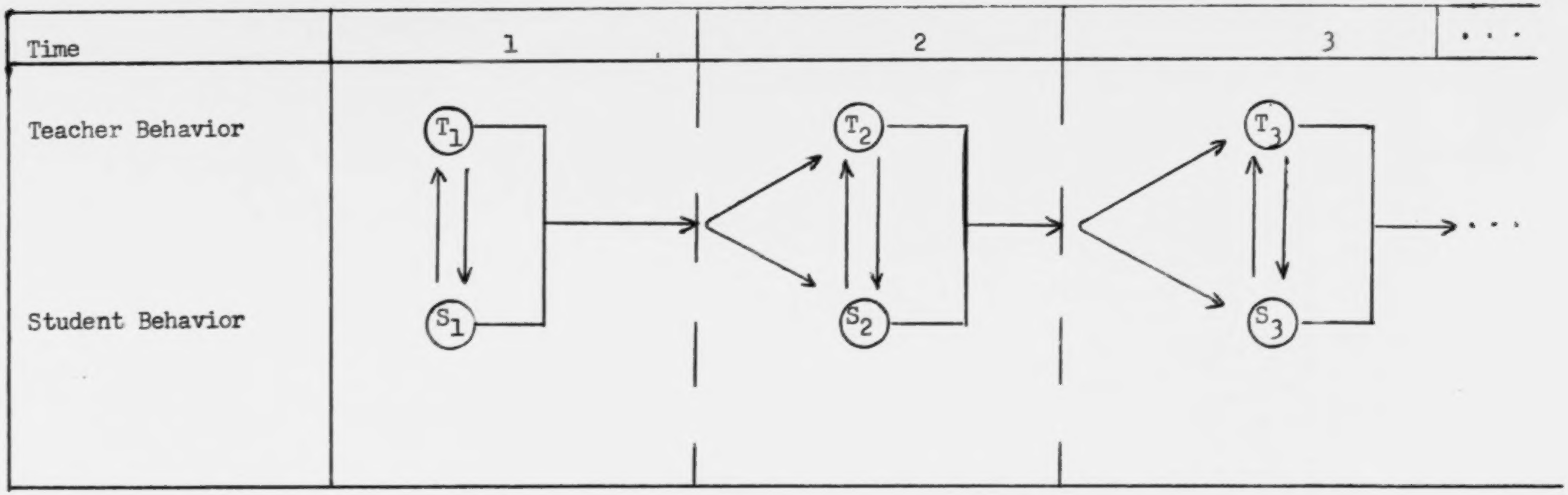
Time
1
2
3
. . .
Teacher Behavior
Student Behavior
T1
S1
T2
S2
T3
S3
. . .

Fig. 3. The interdependence of teacher and student behaviors in a series of encounters.

Organizational Structure and Instructional Consequences

Basically, the structure of an environment represents a variable or set of variables which tend to define the attributes of the situations within which objects interact. For example, the principle of heterogeneous or homogeneous ability grouping tends to structure the immediate educational environment (i.e., classroom) such that children with particular attributes (ability and ethnic and socio-economic status) are brought together for the purpose of instruction. Similarly, the principle of self-contained classes tends to structure the immediate learning environment such that for the most part, the children in a given class on a given grade are restricted to instructional activities that can be provided in a single room and only with the children assigned to that class. In addition, once assigned to a given class, a teacher must plan for and provide all the learning experiences of his children, regardless of his relative competences with respect to the various subject areas and children enrolled in his class. These examples should suffice to highlight the fact that, generally, structure serves as an "exogenous" variable in the teaching-learning process; that is, a variable which is unchanged by the dynamics and interactions of the endogenous variables within a system, but are independently inserted and affect the character of the environment within which the variables interact. Lave and Kyle (1968) diagram this relationship as in Figure 4.

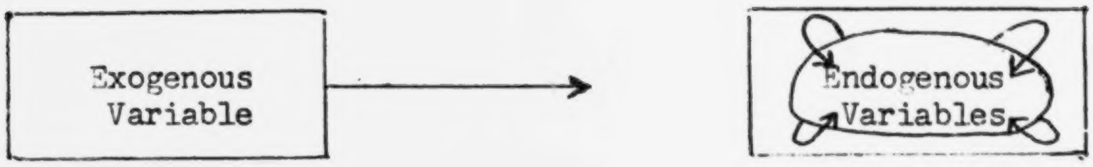

Fig. 4. The operation of exogenous variables.

Given the behavioral frame of reference provided above, it would appear that the structure of an educational environment is related to the behavior of teachers and students engaged in the teaching-learning process. More specifically, given a class of approximately 30 children with no real opportunity for the teacher to confer with other teachers or available professional personnel, or to plan for each child on a daily basis, it seems reasonable to expect that instruction will be class oriented for practically all subject areas. Moreover, given that class-oriented instruction without regard for the individual differences of children is an ineffective strategy, it seems reasonable to expect that any number of children will turn their attention away from "formal" learning activities, and consequently not achieve at a level commensurate with their capability. More generally, it could be hypothesized that objects in an educational environment tend to emit behaviors which are sustained by a network of punishing and reinforcing events which are related to the structural properties of that environment. Given a learning environment X, the relationship may be illustrated as in Figure 5.

It is immediately apparent from the model that all behavior that can be observed in a learning environment is related to the situations which tend to be determined by the structural organization of the environment. Of special importance is the relationship between the specific

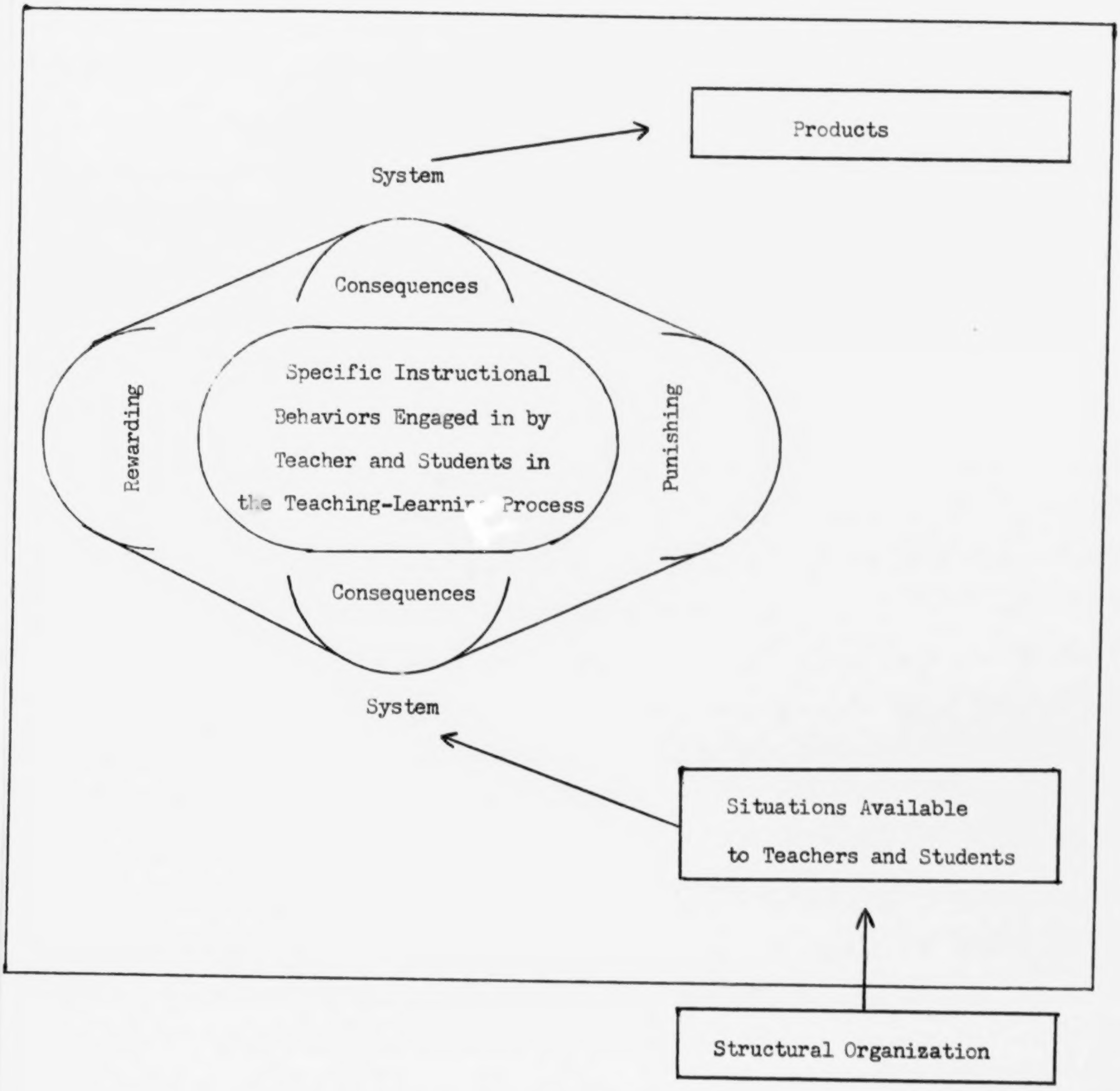
Products
System
Consequences
Specific Instructional Behaviors Engaged in by Teacher and Students in the Teaching-Learning Process
Rewarding
Punishing
Consequences
System
Situations Available to Teachers and Students
Structural Organization

Fig. 5. A behavioral systems model of behavior.

instructional behaviors of teachers, students, and related educational agents, and the reinforcing and punishing events which, in part, are established by the learning situations available to teachers and students. Implicit here is the notion that for teacher T, behavior "A" in situation "r" may result in consequences which are more rewarding than punishing, while this same behavior in situation "p" may result in consequences more punishing than rewarding. For example, given a traditional self-contained classroom structure X, teacher T may not emit behaviors compatible with individualized instruction (observing each child under various learning conditions, planning activities for individual or small groups of children, etc.), since such behavior would require teacher T to spend many additional hours planning for which he is not remunerated; to continue to work alone without the benefit of other teachers who may be more skilled in a given subject area or with methods and techniques for effectively organizing children for small group work; to adopt a new teaching style all at once before the prerequisite skills of the new approach are developed through training; etc. In short, after balancing the range and magnitude of reinforcing and punishing consequences which (it is anticipated) would develop as a result of an alternative pattern of classroom instruction, teacher T may conclude that, given the conditions that exist in the self-contained classroom, engaging in instructional pattern I (which might ultimately result in effective teaching and learning) is not worth the punishing consequences which are likely to result as a consequence of its implementation. However, if teacher T were placed in an educational structure which provided support for instructional pattern I (e.g., planning time, teacher-teacher exchange of ideas, materials, training opportunities in support of individual instruction, etc.), a shifting to

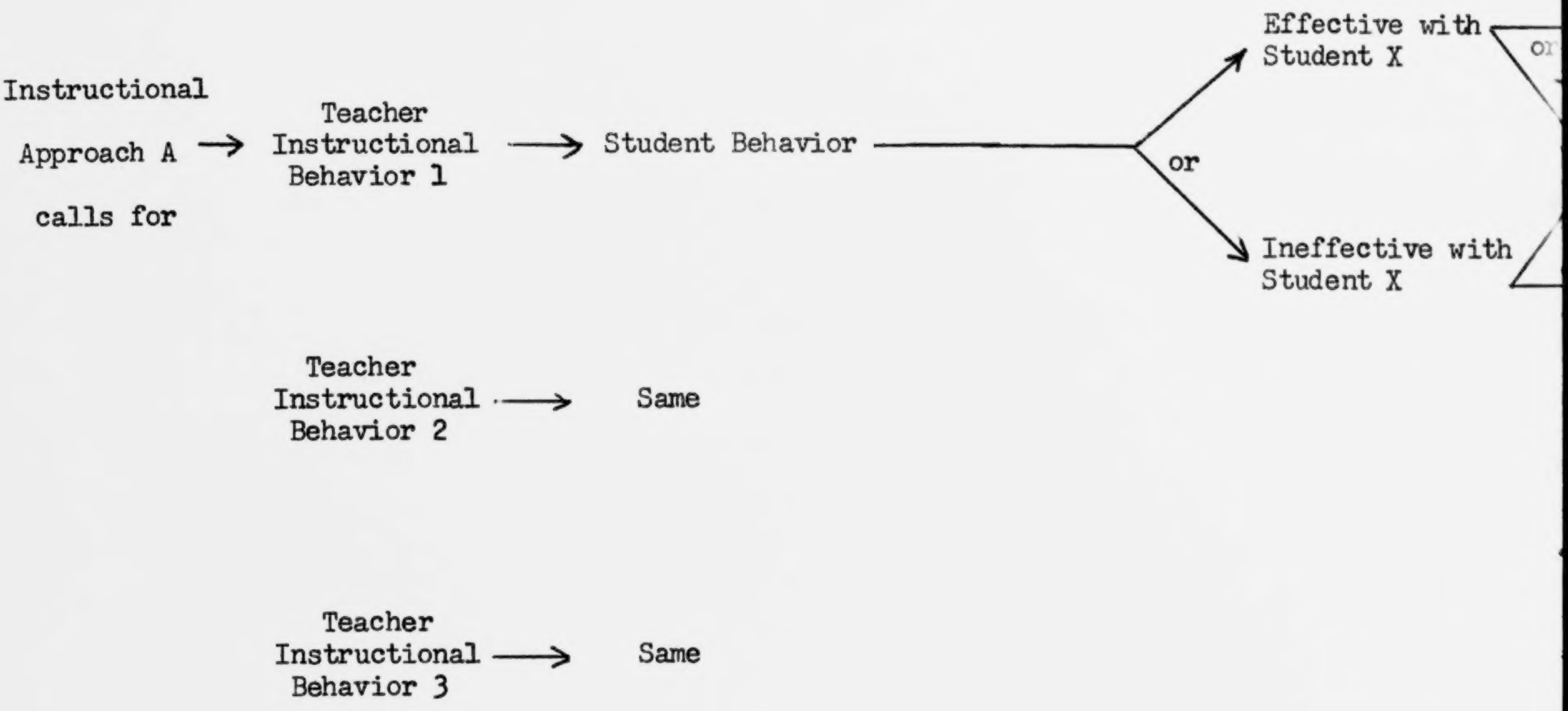
Instructional
Approach A
calls for
Teacher
Instructional
Behavior 1
Student Behavior
or
Effective with
Student X
Ineffective with
Student X
Teacher
Instructional
Behavior 2
Same
Teacher
Instructional
Behavior 3
Same

Fig. 6. Patterns

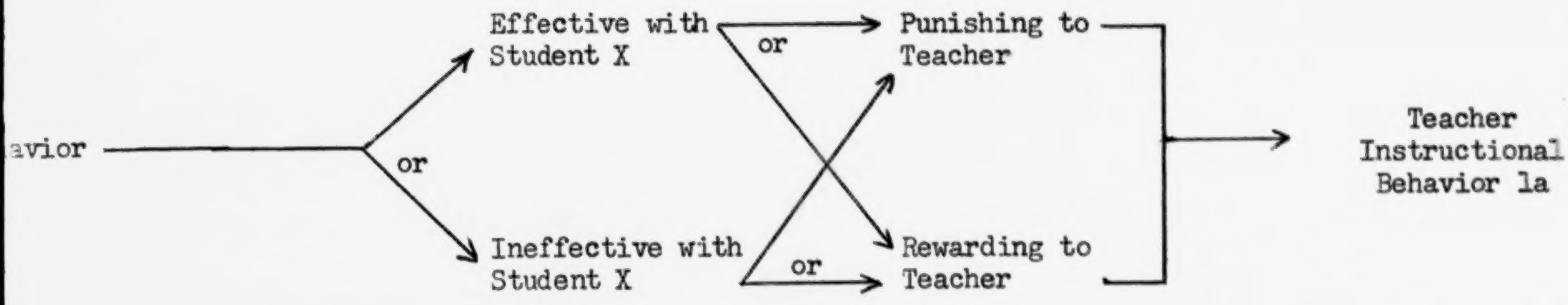
avior
or
Effective with Student X
Ineffective with Student X
or
or
Punishing to Teacher
Rewarding to Teacher
Teacher Instructional Behavior 1a

Fig. 6. Patterns and products of instruction.

reference is that if the structure of an educational environment is related to the behavior of teachers and students interacting in the teaching-learning process, it is also related to the output of that process (i.e., student academic and social achievement or the lack of it). As such, if the objectives of an educational environment are not being achieved, or if the specific behaviors and patterns of instruction manifested in a given environment are judged inappropriate or contrary to the achievement of some set of educational objectives, then the structural properties of the environment should be modified or replaced with a structure that is more likely to cultivate and sustain practices which are compatible with the objectives.

The orientation reflected above suggests a somewhat different approach in explaining the classroom behavior of teachers and students engaged in the teaching-learning process, and consequently suggests alternative routes for establishing instructional settings. For example, even though a student might tend to work more effectively when materials and procedures are geared to his individual learning style, learning history, social maturity, etc., knowledge of these relationships does not necessarily determine the ways and means of structuring the educational environment so that contingencies favoring teacher and student behaviors compatible with the above modes of instruction are likely to develop in the natural classroom setting.

Consequently, one of the major problems for educational psychology is to identify empirically organizational patterns which, when applied to a given educational setting, provide the psycho-structural foundation which favors the emission of and reinforces behaviors which are compatible with a given set of educational objectives and discourages the emission of behaviors which are incompatible. In short, teacher and student behaviors are not independent variables, in the classical sense, when observed in the natural classroom environment. Rather, they are dependent variables manifested in relation to the structural properties of an environment which, as a result of the situations and behavioral contingencies operating in the environment, support the pattern of interaction of all objects engaged in the teaching-learning process.

It should be emphasized that the model explored in these pages is not intended to ignore the influence of idiosyncratic variables which may be operating in an educational environment and which are separate and apart from the structural properties of that environment. So for example, one would expect to find variance among the multiple objects interrelating in a given environment which may be related to individual temperament, previous experience, resistance to change, current expectations, etc. However, the model is intended to focus attention on and provide an explanation for the relationship between the structural properties of an educational environment and the functional characteristics of teachers and students interacting in that environment.

In an effort to explore further the relevance of environmental structure in the teaching-learning process, Chapter VI will present an alternative organization of a typical New York City Special Service Elementary School that is designed to provide the foundation for teacher and student behaviors, and related educational events, compatible with an individualized approach to instruction.

CHAPTER VI

A MODEL TO INDIVIDUALIZE INSTRUCTION IN URBAN ELEMENTARY SCHOOLS: THE STAGGERED SESSION

Given that the structural properties of an educational environment tend to encourage and sustain the behaviors of all agents in that environment, and given the behavioral and systematic ideas that make up the behavioral-systems frame of reference, the present chapter will present an organizational framework which is intended to encourage and sustain behaviors that are consistent with the principle of individualized instruction. It should be emphasized that the general model detailed below represents one of several patterns of organization which can be implemented in elementary schools in New York City, given the physical resources and approximate level of funding that are currently available.

As was suggested in Part I, Chapter IV above, the principle of individual instruction has the greatest chance of being implemented when the educational setting is designed to cultivate and reinforce the emission of teacher and student behaviors compatible with the practice of individual instruction. By way of review, it was argued that the educational environment had to provide for:

(a) frequent teacher-student contacts which would provide the teacher with information about the learner which should facilitate planning for individual pupil success;

(b) flexibility in the use of the educational environment so that individuals or small groups of children could participate in activities more closely related to individual needs; and

(c) the opportunity for individual children to work) or play) in a variety of situations which involve different children, materials, and teachers so that teachers may have the opportunity to observe the conditions under which a given child experiences success.

As will be detailed below, all of these prerequisites are realized when the Staggered Session is adopted. What is the Staggered Session?

Figure 7 indicates that the school day is "staggered" over two full-time sessions. For example, a child assigned to Session I begins the school day at 8:00 A.M. and remains in school until 2:00 P.M., while a child assigned to Session II begins at 10:00 A.M. and remains in school until 4:00 P.M. Similarly, classroom teachers' schedules are staggered over two sessions. Session I teachers arrive at 7:50 A.M. and leave school at 2:10 P.M., while teachers assigned to Session II have 9:40 A.M.-4:00 P.M. school day. In addition, for any given child, 70 minutes each day is spent in a Special Skills Center (C) with a teacher who is not his classroom teacher. Center teachers work from 8:50 A.M.-3:10 P.M.

It is critical to note two consequences of this organization. First, when the children go to the Center (between 12:50 and 2:00 P.M. for Session I, and between 10:00 and 11:10 A.M. for Session II), the activity takes place in a facility outside of the home classroom. That is, in a Science Center (room), Art Center (room), Music Center (room), etc. that is supervised by a full-time Center Specialist who is assisted by an educational aide. Second, as a consequence of Center, classroom teachers and educational assistants are free to take a preparation period

(45 minutes) and a planning period (35 minutes) while the children are working in a Center that is potentially able to help make Science (or Music, Art, Ecology, etc.) a more meaningful experience.

Given a New York City School that is currently operating at capacity (i.e., no free rooms or staff), how can all the children receive four hours of class time and one hour and ten minutes of Center time? Where are the rooms for the Centers? Where is the staff to supervise the Centers? The answers to these questions are simple. To illustrate the solution, let us examine a typical Special Service Elementary School in New York City, P.S. X.

P.S. X is currently organized according to the description presented above (see Part I, Chapter IV). There are 32 classes (and classrooms) in P.S. X on grades 1-5. In addition to the 32 classroom teachers, each of whom is individually responsible for one of the 32 classes, P.S. X is staffed with 11 Cluster Teachers, 2 Corrective Reading Teachers, 1 English as a Second Language Teacher, a Librarian, 1 Health Education Specialist, and 3 Above Quota Teachers. In short there are 32 classroom teachers who are individually charged with the responsibility of planning and implementing the curriculum for one class all year, and 19 out-of-classroom teachers who serve in a relief capacity for teachers, or who provide special remedial instruction for small groups of children.[1] Let us apply the Staggered Sessions organization to P.S. X.

Return to the classroom space portion of Figure 7, but this time eliminate the Center activity by placing your two index fingers over the Center activities (C). Obviously what appears is the traditional "split session" which reduces the school day for each child by approximately one hour. However, in P.S. X (or any other school for that matter)

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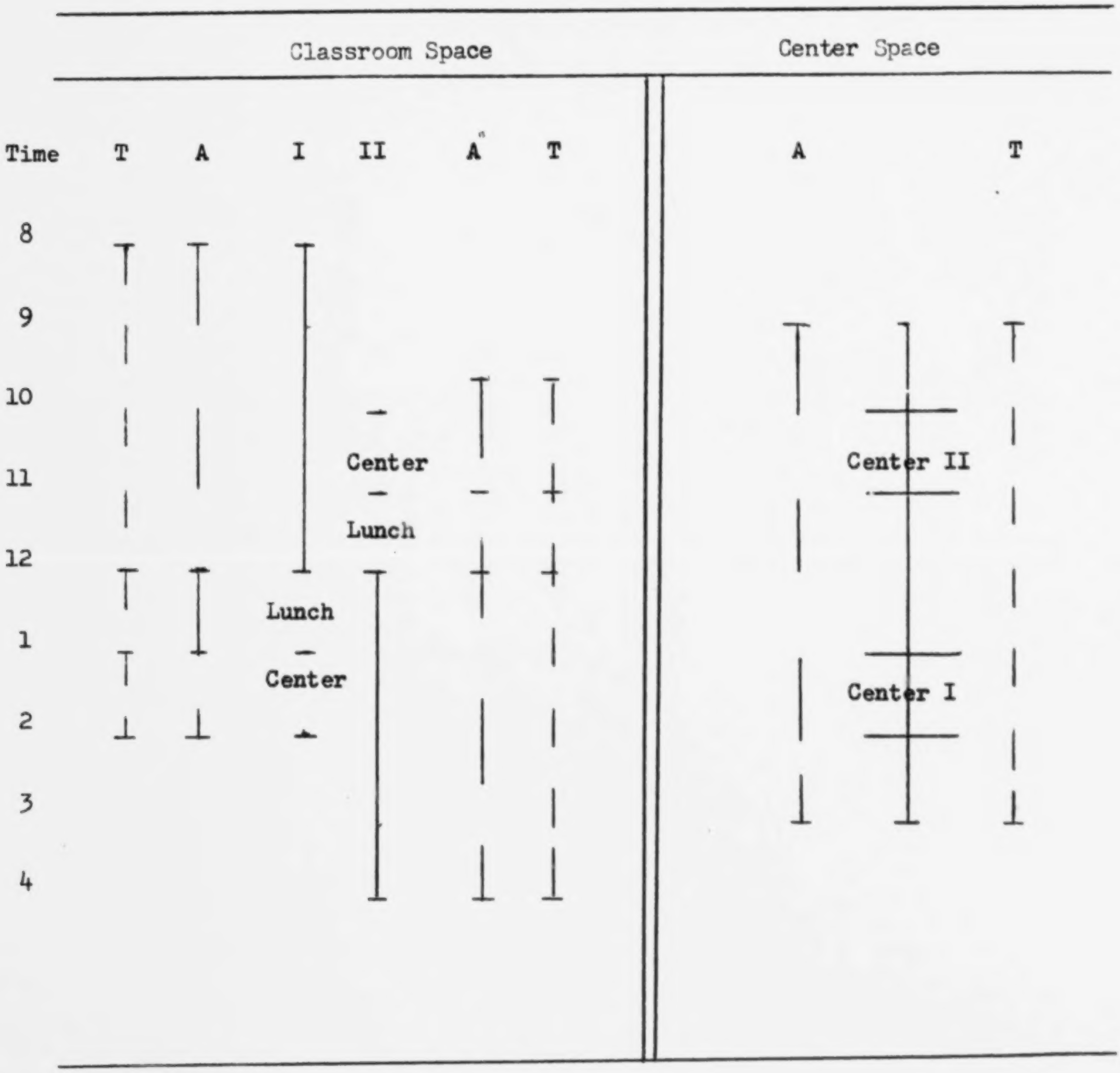
[1] It should be pointed out that having 19 out-of-classroom teachers is not a necessary prerequisite for the Staggered Session organization. In fact, a modification of this structure can be implemented in a school of some 25-30 classes with as few as 7-9 out-of-classroom teachers without violating the Center program, planning features and program elements which are built into the Staggered Session.


Classroom Space
Center Space
Time
T
A
I
II
A
T
A
T
8
9
10
11
12
1
2
3
4
Center
Lunch
Lunch
Center
Center II
Center I

Legend:

T = teacher
A = educational assistant

I = Session I
II = Session II

Fig. 7. Schedules in the staggered session.

several equally important consequences which result are (a) only half of the total classrooms are required to provide instruction for 32 classes, and (b) classroom teachers derive a "natural" preparation period since cluster teachers are not needed to provide the relief period. As a result, by converting to a split session P.S. X will free 16 classrooms, and release 11 cluster teachers 2 hours and 25 minutes each day for "other" activities. These "other" activities involve (a) the full-time supervision of Centers for classes between 10:00-11:10 A.M. and 12:50-2:00 P.M., (b) taking small groups of children out of their classrooms and into the Centers for one or more enrichment experiences and/or (c) joining a classroom teacher for a class activity.

How many Centers are needed for 32 classes? In answering this question let us remember that we have available 16 rooms, 11 clusters and 8 staff members. In addition, there already exist several facilities that could serve as Centers: a Gym, an Auditorium, and a Library.

However, since only half of all classes are involved in Center activities at any one time (either between 10:00-11:10 A.M. or 12:50-2:00 P.M.), facilities for only 16 classes are required at any one time. Table 25 illustrates the feasibility of this requirement in the Staggered Session. Notice that even after we provide for the Centers (10 rooms) and the staff needed to supervise the activities (14), 6 classrooms and 5 teachers remain available for "other" activities. However, in anticipation of one of the added advantages of the Staggered Session, let us add one more Center to the plan (e.g., another Music or Art Center, etc.), requiring one additional teacher for Center and one additional room. What we have remaining then is 5 free rooms and 4 free teachers. What to do with these resources will be determined (in part) by the number of classes on each grade level and the average registers for the respective grade. Table 26 presents this information for P.S. X.

TABLE 25

SPACE AND RESOURCES FOR CENTER ACTIVITIES
(Total Free Rooms = 16
Total Free Staff = 19)

Centers for P.S. X	Number rooms needed	Number classes in Center	Teachers to supervise Center
Auditorium (Assembly once a week)	0	3	2 + 2 E.A.'s
Gym	0	2	1 + 2 E.A.'s
Reading Lab.	1	1	1
Language Arts Center	1	1	1
Math Center	1	1	1
Math Center	1	1	1
Library	0	1	1
Foreign Language Center	1	1	1
Science	1	1	1
Ecology	1	1	1
American Heritage Center	1	1	1
Music	1	1	1
Art	1	1	1
Total	10	16	14 + E.A.'s
Free Resources	6	--	5

TABLE 26

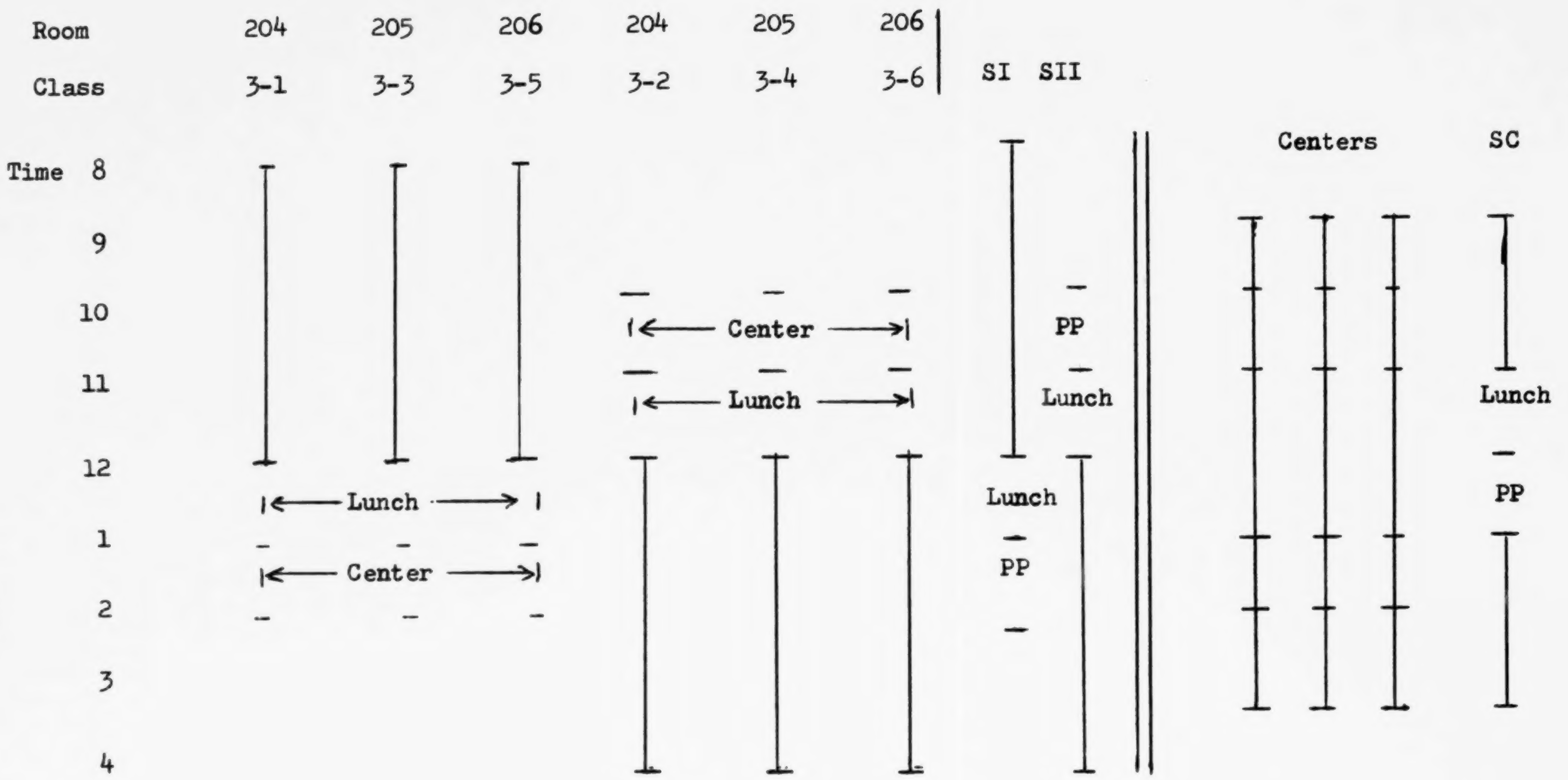
AVERAGE REGISTER AND NUMBER OF CLASSES IN P.S. X

Grade	Number classes	Average register
1	5	28
2	5	29
3	6	25
4	8	27
5	8	26
Total	32	

Given the above information, let us create one more class on grade 1 and one more class on grade 2. This results in six classes each for grades 1 and 2 and a new average class register of approximately 23 children per class in the early primary. As a result, we have used one of the remaining four rooms and two of the remaining four teachers. Since we have already allocated one additional Center activity to provide for an additional two classes, we have remaining four free rooms and two free teachers. With regard to these resources, let us (a) reserve the two teachers to supervise and coordinate an Instructional Resources Center for teachers (requires one room), (b) designate two rooms as Teacher Planning Centers, and (c) designate one room as a Parent Center.

If the reader is asking how the above plan helps the classroom teacher to individualize instruction, the answer is that the plan (as it stands) does not significantly alter the classroom and, consequently, will probably not effect changes in classroom instruction. It could be argued, of course, that the establishment of the 13 Enrichment Centers and the 2 hours and 25 minutes each day available for Center Specialists to work with individual and/or small groups of children in the Centers, or with classroom teachers in class, does offer some added opportunity for individualizing instruction just as the establishment of an Instructional Resources Center provides the staff with opportunities to survey new commercial and teacher-developed materials for children. In addition, the fact that teachers are provided with an additional 35 minutes each day to plan and have available several Teacher Planning Centers in which to work or hold grade meetings should help to encourage more planning-related activity on the part of the staff. However, notwithstanding these advantages, the Staggered Sessions offers the foundation for additional and more direct kinds of changes in classroom instruction. Given the structural framework defined above, the following restructuring of the classroom is directly addressed to individualizing instruction insofar as it provides for (a) flexible clustered class arrangement, (b) the opportunity for teachers and educational assistants to meet on a daily basis to evaluate individual student progress, and therefore, more effectively plan for the educational experience of individual children, and (c) an educational environment that will sustain the coming together of a rich mixture of children for learning in task-oriented small group instruction. How can all this be achieved in the urban elementary school? (See Figure 8.)

Figure 8 represents a triple version of the model presented in Figure 7. From the above it is clear that six classes are located in three classrooms: 204, 205, and 206 (classes 3-1, 3-3, and 3-5 are in the classrooms between 8:00 A.M. and 12:00 noon, and classes 3-2, 3-4, and 3-6 are in these rooms from 12:00 noon to 4:00 P.M.). Equally clear is that classes 3-1, 3-3, and 3-5 are engaged in Center activities between 12:50 P.M. and 2:00 P.M., and that classes 3-2, 3-4, and 3-6 are engaged in Center activities between 10:00 A.M. and 11:10 A.M. In passing, note that since the three Center Specialists supervise all six classes for Center (three classes at a time), the Center arrangement (a) frees the Center Specialist to work with individuals or small groups of children 2 hours and 25 minutes each day (6 hours and 20 minutes minus lunch [50 minutes], preparation [45 minutes] and two Center periods [140 minutes] = 145 minutes), and (b) frees the classroom teachers and educational assistants each day for a 45-minute Joint Preparation Period and 35-minute Joint Plan Period (classroom teachers of 3-1, 3-3, and 3-5



Legend:

SI = Teachers and educational assistances on session I.
SII = Teachers and educational assistances on session II.
SC = Center staff schedule.
PP = Preparation and planning time for staff.

Fig. 8. Triple version of Figure 7.

have Joint Preparation and Planning Periods between 12:50 P.M. and 2:10 P.M.; classroom teachers of 3-2, 3-4, and 3-6 have Joint Preparation and Planning Periods between 9:50 A.M. and 11:10 A.M.). But how does this model help teachers and educational assistants to individualize instruction in the classroom?

Given the physical plant and resources that are presently available to elementary schools in New York City, it seems clear that the self-contained classrooms organization militates against the principle of individual and small group instruction (see Part I, Chapter IV above). In fact, even in experimental schools which are funded to provide individual instruction, the extent of the practice remains negligible in self-contained classes. This is not to say that individual instruction cannot be achieved in schools, but that the present organization of elementary schools and classrooms cannot sustain the prerequisites of individual instruction. However, if the educational environment can be designed to provide teachers with the opportunity to implement and sustain individual and small group instruction, given the present resources available to elementary schools, then individual and small group instruction will tend to occur and the benefits reaped by children and teachers. As will be observed below, with the establishment of clustered classes, the Staggered Sessions helps to provide teachers with that opportunity.

Let us introduce two related structural properties: Clustered Classes and Joint Responsibility. Clustered Classes refers to the coming together of children from various classes on a grade or across grades for the purpose of providing children of particular abilities, interests, etc. with educational experiences which, presumably, capitalize on the similarities and/or differences among children. In practice, what usually occurs is that a single subject (e.g., reading) is selected and children from various classes on a grade are redistributed into "homogeneous" class groups on the basis of reading achievement. In order to coordinate this operation, reading usually occurs at the same time each day and teachers meet once a week (for approximately 45 minutes) to evaluate the progress of children (some 120-180 in all) and to plan the activities for the coming week. Theoretically, the teachers on a grade (approximately five-eight) are jointly responsible for the children. However, given (a) that teacher A sees student B for only 45 minutes or so each day, (b) that teachers do not have the opportunity to plan together on a frequent basis, and (c) that teachers do not have the opportunity to work with and observe the children engaged in a variety of experiences, it frequently turns out that the teachers become jointly responsible for arranging the reading activity and not jointly responsible for providing children with experiences geared to meet individual needs and capabilities. In addition, planning for the experiences that comprise the remainder of the school day (220 minutes) remains the sole responsibility of the classroom teacher. In short, of the few clustered arrangements that are currently implemented in elementary schools, the pattern usually employed represents a departmentalized reading or arithmetic plan that is frequently used for all curriculum areas in junior and senior high schools.

Joint Responsibility refers to the sharing of responsibility for all curriculum areas by a team or cluster of classroom teachers. That is, two or three or more teachers are equally responsible for two or three or more groups (classes) of children. This arrangement has significant educational advantages when the team of teachers have the opportunity to plan the curriculum on a daily basis. Given the fact that in the Staggered Session teachers and educational assistants are provided with a

35-minute planning period (above and beyond the 45-minute preparation period) which occurs at the same time for all Session I staff (1:35 P.M. to 2:10 P.M.) and Session II staff (10:35 A.M. to 11:10 A.M.), then it seems likely that the principle of Joint Responsibility has a greater chance of being effected in the Staggered Session type of organization.

Figure 9 below duplicates Figure 8 with two significant alterations. First, self-contained classes 3-1, 3-3, and 3-5 are clustered to form Class 3-I, and self-contained classes 3-2, 3-4, and 3-6 are clustered to form Class 3-II. In addition, the respective teachers and educational assistants are clustered and given Joint Responsibility for planning and implementing the instructional activities for all children in the cluster. Similarly, three Centers are clustered with the three teachers and three educational assistants jointly responsible for the enrichment activities.

Obviously, the pattern outlined above represents a major reorganization of the physical and manpower resources currently available to elementary schools. Given the behavioral and systemic ideas discussed in Part II, Chapter V, it seems that the Staggered Session provides a foundation which would encourage and sustain classes of behavior by children and teachers more compatible with individual and small group instruction, and therefore, have major consequences with respect to the cognitive and social development of children. Of course, only empirical tests of the model will indicate whether and to what extent the Staggered Session can effect behavioral change in the classroom.[1] However, certain

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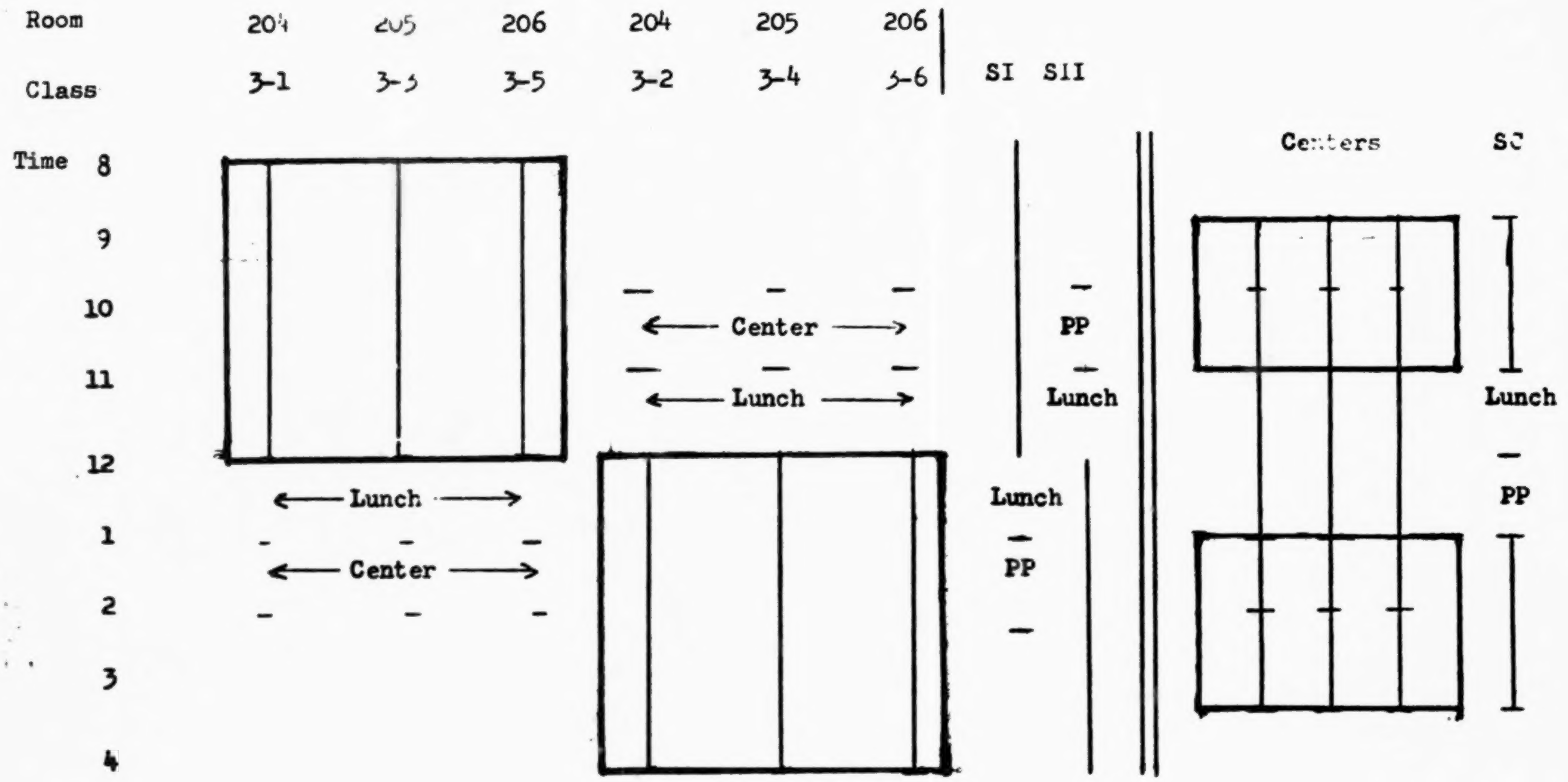
[1] At the present time the model is being field tested in a New York City Special Service Elementary School.


Room
204
205
206
204
205
206
Class
3-1
3-3
3-5
3-2
3-4
3-6
SI
SII
Time
8
9
10
11
12
1
2
3
4
Lunch
Center
Center
Lunch
PP
Lunch
Lunch
PP
Centers
SC
Lunch
PP

Legend:

SI = Teachers and educational assistances on session I.
SII = Teachers and educational assistances on session II.
SC = Center staff schedule.
PP = Preparation and planning time for staff   Center Staff Schedule

Fig. 9. Three classes clustered in the staggered session.

consequences may be anticipated:

1. Composition of the classroom

Given the clustered arrangement and the number of professional and paraprofessional staff available, it is unnecessary to restrict the composition of the cluster to children who (presumably) are of the same ability. Therefore, one may anticipate a greater willingness on the part of teachers and parents to organize classes so that a rich mixture of children is represented in the cluster.

2. Team approach to instruction

Given that teacher and paraprofessionals are now jointly responsible for the children, and given that time and space is made available to plan and work together both in and outside the classroom, a team approach to instruction could develop.

3. Classroom instruction

A variety of consequences could be anticipated. For example:

a. Teachers could organize a much wider range of instructional groups for the entire cluster for all subject and curriculum areas. In fact, given that an average of approximately two and one-half reading groups presently exist in the self-contained classroom, one could anticipate approximately eight groups across the cluster. Furthermore, given that teachers and paraprofessionals are working with small groups of children more frequently an individualized approach to planning for instructions should be encouraged.

b. Insofar as the Staggered Session makes it physically possible for many alternative modes of instruction, one may anticipate experimentation on the part of teachers regarding the particular patterns employed with a given child or group of children.

c. Since six classes share the same set of three classrooms (three classes each session), a much wider range of hardware and software can be purchased given the current level of funding. Consequently, teachers as well as children could be exposed to more current curriculum ideas and methods.

d. The range of teachers and paraprofessionals available to all of the children makes it possible for children to work and play with a variety of teachers and children so that teachers may observe the particular set of conditions which work best for a given child.

e. The three-room space provides teachers with the opportunity to plan for and implement multiple activities in the environment. For example, small group Reading could be conducted in Room A with Teacher X (who is particularly skilled in the subject) while Science or Arithmetic or any other subject is presented in Rooms B and C.

4. Teacher and paraprofessional training

The opportunity for informal and formal in-house training of team members is enormous. Teachers will tend to observe and consult with one another when problems arise. Paraprofessionals can work with teachers within the classroom and have a greater opportunity to discuss areas of strength and weakness during the daily planning sessions.

The above represents a very limited list of some possible consequences of a shift from the self-contained classroom structure to

Clustered Classes within the Staggered Sessions. Not even touched on was the possible impact of the Enrichment Skills Centers and the opportunities for a highly competent and specialized core of subject area consultants. In addition, the fact that first-year teachers have the opportunity to work with co-teachers who have had some years of experience with teaching children of a given age, in working with parents in a given community, in dealing with school administrators, etc. should enhance the initial contribution and future development of the freshman teacher.

CHAPTER VII

SUMMARY AND SOME CONCLUDING REMARKS

In this study, several examples of the relationship between environmental structure and the functional characteristics of objects interacting in an environment are presented and interpreted within a frame of reference that is derived from a synthesis of concepts and principles taken from behavioral and general systems theories. For this purpose, data gathered from studies of ability grouping are re-examined with specific reference to two dimensions of an educational environment: a) the ethnic and socio-economic composition of classes organized according to the principles of homogeneous and heterogeneous ability grouping, and b) the patterns of instruction in homo- and heterogeneous classes when that structure is compounded by a self-contained classroom structure.

In Part I of this study, careful examination of the evidence indicated that in a relatively desegregated setting, the structural requirements of homogeneous ability grouping tends to reinforce and perpetuate the racial dilemma in the society at large. That is, given the evidence that large proportions of children of non-white and low socio-economic status consistently tend to fall into the lower portions of standardized test score distributions, and given the fact that standardized test scores serve as a principal criterion in assigning children to the various ability levels within a grade or school, it was noted that in a relatively desegregated educational environment a) large proportions of children from ethnic minorities and low socio-economic status will tend to be assigned to the lower ability groups and track curricula than will non-minority children and children of middle socio-economic class status and b) homogeneous ability grouping tends to encourage and sustain the development of a self-fulfilling prophecy of school failure in low ability groups which systematically tends to restrict the range of opportunities and quality of experience that can be provided in the classroom.

In addition, research and summaries of research studies which investigated the educational value of ability grouping, suggested that despite the fact that the practice is intended to provide for more comprehensive attention to individual differences in children, there exists a notable lack of evidence to support the practice of ability grouping as an instructional arrangement in the public schools. The evidence did not suggest that children who were assigned to the "fast" or "gifted" groups, and children assigned to the "slow" or "retarded" groups consistently outperformed children not assigned to classes on the basis of test performance ability. Contrariwise, the evidence suggested that the separation of children into distinctly different and isolated learning environments (schools and classrooms) systematically deprived all children, particularly those assigned to low ability groups, of the variety of experiences and learning opportunities that were potentially available in the integrated educational setting. In short, it was concluded that the structural requirements of the principle of homogeneous ability grouping orders the educational environment so as to stigmatize children placed in lower ability groups, and therefore constitutes a violation of the principle of equal educational opportunity.

In Chapter IV, the relationship between structure and function was further illustrated in terms of the patterns of instruction which emerge in homo- and heterogeneous classes when that structure is compounded by the self-contained classroom structure. The data tended to support the following conclusion: Regardless of the principle governing the pupil composition of the self-contained classroom, a) no reliable differences existed in the patterns of instruction and achievement manifested in the course of the teaching-learning process, and b) neither practice resulted in the development of an individualized approach to instruction.

In Part II of this paper, the investigator presented a theoretical discussion of the process underlying the interrelationship between the structural characteristics of an educational environment and the functional characteristics of objects interrelating in that environment. In the course of this discussion a principle was conceptualized within a behavioral-systems frame of reference to the effect that:

> Objects in an educational environment tend to emit behaviors which are sustained by a network of punishing and reinforcing events which are related to the structural properties of that environment.

Three major implications of the behavioral-systems frame of reference were presented for consideration. The first suggested that if the objectives of an educational environment are not being achieved, or if the specific behaviors and patterns of instruction manifested in a given environment are judged inappropriate or contrary to the achievement of some set of educational objectives, then the structural properties of the environment should be modified or replaced with a structure or structures more likely to cultivate and sustain practices compatible with the objectives.

The second implication had to do with the traditional treatment of the behavior of teachers, students, administrators, or any other natural setting agents in the learning process as independent variables in educational research. Alternatively, if the behavior of these agents is functionally related to the structural properties of the environment within which they interrelate, then, in part, such behavior should be considered as a dependent dimension manifested in relation to the situations and behavioral contingencies operating within a particular environmental structure. Obviously, this is not to suggest that all behavior or any single unit of behavior will not be manifested in many disparate envisironmental organizations. However, what is suggested is that in the absence of clear and definitive evidence to the contrary, behavior should be considered as a relational phenomenon which is not, generally, independent of the structural properties of an environment.

A third implication of the behavioral-systemic frame of reference represents a corollary of the second. That is, given some specified set of educational objectives, one of the major problems for educational psychology is to identify empirically organizational patterns which, when applied to the natural educational setting, provide the psycho-structural foundation which favors the emission of and reinforces behavior which is compatible with the objectives, and discourages the emission of behavior which is incompatible. Clearly, this task requires the development of methods and procedures which permit the structural dimension to appear as an integral factor within educational research and calls for a conception of "variable" which is inherently polynomial.

Finally, in an effort to further explore the relevance of environmental structure in the learning process, Chapter VI presented an alternative organization of a typical New York City Special Service Elementary School that is hypothesized to provide the foundation for teachers and student behaviors, and related educational events, compatible with an individualized approach to instruction.

In closing, the investigator should like to comment on the current status and predicted trends for the continued use of the ability grouping structure in the public school system.

It is inconceivable that men and women who hold the policy-making powers for school districts, schools and classrooms are totally unaware of the undesirable educational, social, and political consequences of ability grouping. However, notwithstanding the evidence against ability grouping, several recent surveys clearly indicate that ability grouping, on a national level is: (a) presently one of the predominant methods for organizing or classifying children into classroom units on both the elementary and secondary grades, (b) becoming more and more prevalent and is likely to be more widespread in the near future, and (c) occurs more and more frequently as a child progresses each year through the elementary and secondary grades. The conclusion seems obvious. If one of the principal objectives of the American education system is to provide each child with an equal educational opportunity to maximize and develop his potential so that he may benefit himself, and thereby more effectively contribute to the larger society, then the present status and future trends with respect to ability grouping suggest that this cardinal objective will not be realized. In a very real sense, the extent to which the current practice of ability grouping is permitted to exist in public schools represents the extent to which professional educators and governmental agencies sanction a self-fulfilling prophecy of school failure and sub-quality education in a setting that is charged with the responsibility of developing each child to his fullest. It would seem that such an expectation is reason enough to put a halt to the practice of ability grouping. That the practice also tends to relegate disproportionate numbers of disadvantaged youth to inferior self-contained classrooms and to discourage alternative thinking and flexibility in the design of effective learning environments compels educators to eliminate the practice and turn attention to developing (and testing) educational models and materials which provide the psycho-structural foundation to support an individualized approach to instruction.

Given the small group and individualized instruction orientation, classrooms do not have to be organized to achieve homogeneity with respect to "ability" or achievement in a given subject area. Rather, forming groups of children who vary with respect to attitudes, learning styles, ethnic and socio-economic status, achievement, and social maturity, within a structure which encourages flexibility in arranging instructional experiences, could serve as the foundation for innovative and hopefully successful approaches to equalizing educational opportunity. The behavioral and systematic interpretation of the relationship between structure and function in determining the character and quality of classroom experience suggests one dimension worth examining in an effort to achieve this goal.

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